Engineering News-Record

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October 8, 1931

How the New
McGraw-Hill Building
Was Built for
Economy and Efficiency

. . . told in three articles

Convention Reports

N.E.W.W.A. at Boston

A.G.C. at Washington

State Highway Officials
at Salt Lake City

The Dallas Gas Company Building

Dallas, Texas

Architects: Lange and Witchell
Structural Engineers: Gardner and Howe
General Contractors: Jopling Construction Company

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Framework of BETHLEHEM SECTIONS

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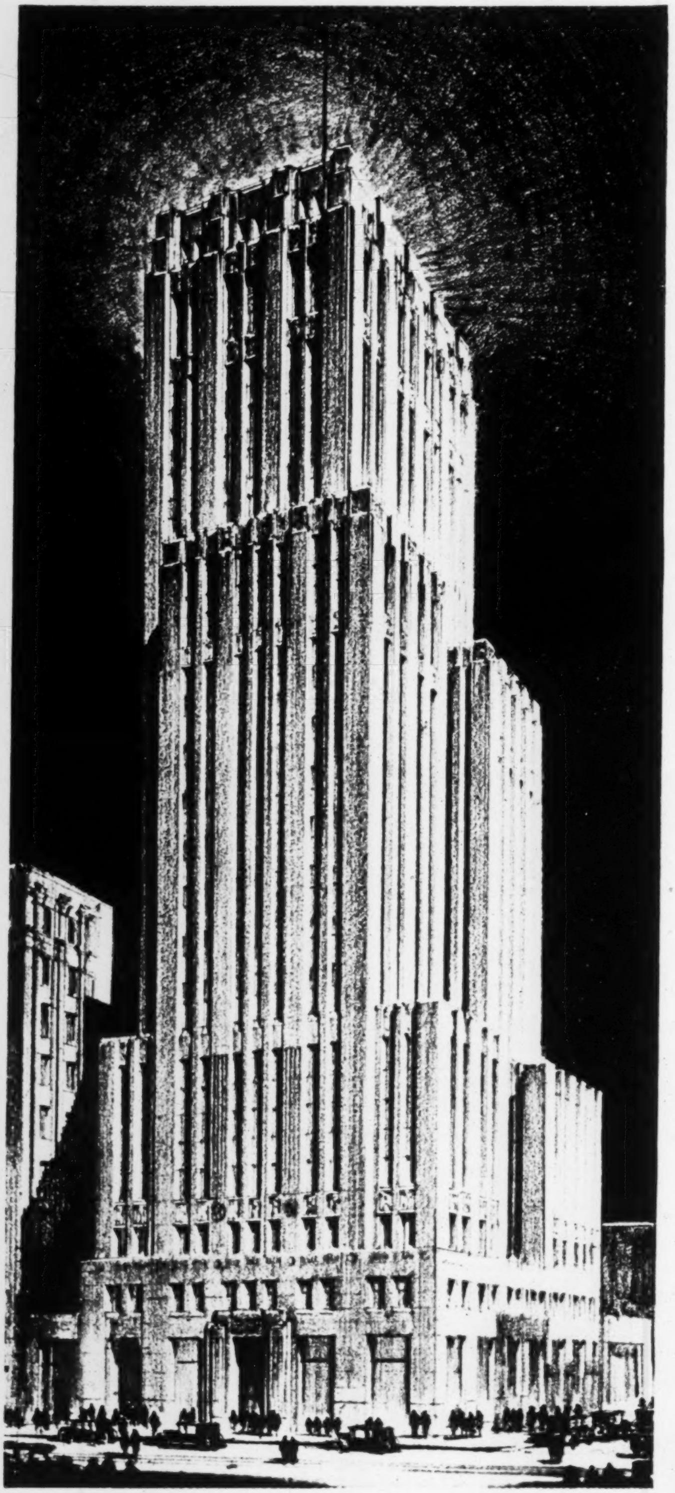

At the present time the Dallas Gas Company Building is 13 stories high. Provision has been made for an ultimate height of 23 stories, as shown above.

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ENGINEERING NEWS-RECORD

A WEEKLY JOURNAL OF CIVIL ENGINEERING AND CONSTRUCTION PRACTICE

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F. E. Schmitt, Editor

OCTOBER 8, 1931

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Announcement

WITHIN two weeks Engineering News-Record will move to its new home, in the recently completed McGraw-Hill Building at 330 West 42d St., New York City, where it will have improved publishing facilities at its command. Our friends will be cordially welcome there.

THE PUBLISHER.

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Functional Building Design

PART of this issue is devoted to three articles on the planning of the new McGraw-Hill Building, our future home. They give a brief account of the way in which the architects, starting out with rigidly fixed conditions of service, set themselves the problem of devising a structure most perfectly suited to its assigned functions. Their procedure followed the best traditions of the engineering art. Planning a building in strict response to service requirements is common for industrial buildings, but virtually unknown in the case of office buildings. It took courage to follow this course consistently, and seek beauty of form in truth of expression. The architects made the wall explicity an inclosure rather than a dress, for example. In their work as a whole they marked out a course that may point the road of future architectural advance. They were ready, also, to adapt materials in new ways. Since the engineer regularly operates in this manner, perhaps there is not so wide a separation between engineering and architecture as many have believed.

Coordinated Construction

HOW this planning was converted into the reality of a physical building is another story. Further planning was involved, but it was essentially a matter of coordinating separate groups of mental resources—those of architect, owner and builder—for the best result. By virtue of this coordination beginning at the very inception of the project and continuing to its completion, the building was erected with a speed ranking well with the best performance of the modern skyscraper builder; it was built at remarkably low cost; and friction or dispute was absent. A. J. Eken's description of how the system operated refers to many distinct ways in which it promoted economy and time-saving. Without here entering into a discussion of the comparative merits of choosing a builder by competitive bidding or by direct selection, we commend Mr. Eken's account to the reader's attention. Be it noted that the selection method depends on complete trust and confidence, the highest aim of the conscientious builder. But regardless of method, the concrete achievement reflected in his account represents one of the contributions that the McGraw-Hill Building has made to the art of efficient construction.

Government to Cut Construction

A SEVERE cut in the budget of the Interior Department for 1932, announced by Secretary Wilbur, includes the curtailment by several million dollars of the construction under way by the Bureau of Reclamation. While this cut is considered essential as a matter of national economy, it means less employment, which is a serious consideration. Fortunately it will not take effect this winter, the time of immediate emergency. Nevertheless the very fact that a reduction has been decided upon indicates that the plan of increasing public-works construction during a depression in order to relieve the shortage of employment is no longer considered important in Washington—not as important as when Congress last spring increased the highway appropriation to provide additional work. This conclusion is confirmed by the failure of the federal government to take any steps toward making jobs this winter. Altogether it is increasingly clear that the whole responsibility for saving the situation through public-works construction rests on the states and cities.

Good State Spirit

THAT leading state officials are conscious of this public responsibility was clearly evident at the State Highway Officials' meeting at Salt Lake City. They displayed a live sense of their obligation to provide work. It was expressed openly in earnest pledges to produce as many jobs as possible on highway construction during the coming months within any reasonable limits of economy, and was restated even more forcibly wherever groups gathered in conversation: "Cut red tape—start jobs that require hand labor—watch for distress in local districts—cooperate with local agencies in regard to needy individuals—pay for day labor promptly—rotate work to make more part-time jobs"—and so on. The leadership of the Bureau of Public Roads in removing some of its usual restrictions in order to expedite the opening up of more jobs should help to energize state activities and enlarge programs. Highway work will probably not produce jobs for all or take up all the slack in the present extreme situation, but with careful planning it can be made to render a great service. If highway officials and engineers return home and put into active execution the ideas expressed at the convention they will do a worthy public service and reflect credit on their organizations.

Getting to Work

EVERYWHERE state and city employment work is a burning subject of interest, as is shown by ample evidence. Many cities are setting about to plan energetically; those that did special unemployment work last winter are continuing even more earnestly. Ways and means were discussed last week by the Associated General Contractors and are to be discussed by the American Society of Municipal Engineers and by other organizations. Engineering Council has issued a call for the formation of state engineering committees, which in turn are to form local or community committees to plan and help get under way job-making local public works. The Council's proposed system of organization promises well and deserves the help and cooperation of every engineer; without full local cooperation by engineering groups it will not be possible to carry through the great volume of survey and planning work required to get actual construction going by winter. Conflict or overlap in such work as this is sure to do harm; energetic cooperation, however, can achieve much.

A Financial Plan

ONE difficulty not touched by the Council's local-organization scheme is that of financing the job-making construction. Most cities have no surplus tax resources, as everyone knows. Some have no free bonding power, and others cannot sell bonds except at high cost. A plan devised by Malcolm Pirnie and indorsed last week by the New England Water Works Association shows a possible way out. The state would pay the interest on local relief bonds during three years, raising this interest money by a very moderate increase in taxation. After the three-year period the works built with the bond money would be paying for themselves, either in revenue or in service benefits, and the cities could afford to carry and amortize them. The plan invites most favorable consideration as a device for strengthening local credit and giving bonds a ready and sound market. It rests on the assumption that enough revenue-producing construction (such as waterworks enlargement) can be made ready for the coming winter to take care of most of the unemployed. The assumption is doubtful. But even non-revenue-producing work is worth including under the plan. The gain to the city through giving work instead of charity is very cheaply bought at the price of the bond interest charge.

Hundreds of Millions

RATHER hopefully we forecast a few months ago that the southern California water area would approve the huge Colorado aqueduct project. Last week the voters did so, authorizing an issue of $220,000,000 of bonds to finance the project. This is real courage. Even in drivingly prosperous times such a piece of financing for a single project would command worldwide attention; more compellingly so in the present depressed conditions. Significant of the strong convictions of the people that the aqueduct is a vital necessity for their future existence is the overpowering majority for the project—a favorable vote of five to one in the whole district, and in Pasadena even fifteen to one. Actual construction will soon go ahead. It may be delayed a short time by litigation to dispose of any slight legal doubts that may exist on the validity of the action taken, but the vote itself removes any question as to early progress. It is proper to recall that the project is formidable not only in its financial aspect but quite as much so in its engineering. Building a great tunnel and siphon line more than 200 miles through mountain and desert country, in an earthquake region, crossing one of the country's major fault lines, presents problems as great as any encountered in American engineering practice for a long time past. Successful completion of the work will give it a prominent page in the records of difficult design and construction for many decades to come.

A Timely Undertaking

A TIMELY undertaking is being carried out under the direction of the Chief of Engineers of the Army. The several district engineers are conducting studies of bridge clearance requirements on navigable waterways. Hearings began three or four months ago and are to be extended over the country. Bridge engineers will recall the numerous cases in which seemingly arbitrary clearance requirements were imposed on bridges—varying heights and lengths of clearance for waterways of the same class, or severer requirements on a secondary waterway than on a waterway of superior class. Such occurrences have been building up a belief that the War Department is antagonistic to bridge construction and regards land traffic across waterways as having only a sufferance right as against the preferential right of water traffic. Some engineers also had come to feel that action on a bridge clearance application often depended more on whether the officials of the department favored the bridge project than on what clearance the water traffic required. In view of these conditions it is urgently desirable that definite principles governing bridge clearances be established. The present inquiry is constructive in helping toward this end. It would be particularly helpful if so definite and fair a clearance doctrine could be laid down that Congress could enact it into law.

Developing Executive Ability

SOME interesting conclusions stand out in a survey of the economic status of engineers made recently by the American Society of Mechanical Engineers. Analysis of earnings reported by more than 9,000 mechanical engineers shows that graduates from technical schools earn approximately $500 more per year than men without such training between the ages of 25 and 35 years, and that beyond 35, with certain notable exceptions, the difference increases to $1,000. The exceptions are the men who do not "combine with technical skill a generous capacity to deal with and manage men and affairs." In these men, failure to develop executive ability in the formative years after they get out of school becomes a more important factor in determining their progress than their technical skill; they slip back into the position of furnishing the technical skill for the men who were unable to obtain that skill as part of their own education but whose training did develop executive ability. Such a finding serves to emphasize the engineer's need for developing executive ability along with the broadening of his technical experience.

Another finding of the committee adds weight to this conclusion. It found that the engineer who takes postgraduate work seldom reaches the higher salaried classifications, a result which it ascribes to the fact that such men tend to stay in purely research positions where high salaries are not paid. Two conclusions may be drawn from this: Either the men whose natural inclinations lead them into such extended study are lacking in natural executive ability, or else their concentration upon purely technical matters over a long period of years effectively suppresses any natural ability they may have had. In either case conscious effort to develop executive ability must be made by such men if they would become well-rounded engineers rather than highly specialized technicians.

Municipal Stadiums

A DESIRE for sports stadiums similar to that which swept the universities and colleges from 1920 to 1925 and resulted in the building of nearly 100 structures periodically shows signs of breaking out afresh among municipalities. Municipal stadium construction has never become epidemic as it did with the colleges, but nearly every year sees at least one new city-owned structure completed. This year it is Cleveland that adds to a list which now includes the Philadelphia sesquicentennial stadium, the Los Angeles coliseum, Soldiers Field in Chicago, the memorial stadium in Terre Haute, Ind., the Rose Bowl in Pasadena, and stadiums in Baltimore, Birmingham, and Portland, Ore., to mention only a few of the larger ones.

There is conflicting opinion as to the desirability and even to the justification of municipally owned stadiums. Those in favor of such structures point out that well-attended sports contests bring visitors to the city and thus stimulate business, that outstanding football games or boxing bouts advertise the city, and that local citizens can view these spectacles without leaving their home town. Opponents will grant all of these claimed advantages and still find good reasons for opposition. They do not believe it logical that citizens of a community should pay taxes to build a structure that they are charged to enter and from which many of them will derive no use whatever. They can see no economic justification in a structure that stands idle three-quarters of the year. And they see in such structures a splendid chance for the operation of favoritism in the granting of concessions and of political graft generally.

Much might be said in favor of the stand taken by the oppositionists. Too many municipal stadiums are built with only one or two sports in mind. Cleveland seems to have done better in this respect than some, but even there the authorities have counted heavily on securing a contract with the local professional baseball club. If municipalities are to embark on a stadium-building program, the structures should be envisioned—and used—as centers of a well-rounded program of civic recreation, available to every taxpayer, free or at a nominal cost. Not only sports events, but concerts, pageants, political meetings and general assemblies should be fostered. As a big brother of the old park bandstand, the municipal stadium can be justified; as a money-making proposition, a city advertisement and a political plaything, it has no excuse for existing.

Departmentalized Industry

WHEN Gerard Swope proposed an advanced plan for protecting the security of the industrial worker in his address to the National Electrical Manufacturers Association three weeks ago, he accompanied it with a proposal for cooperation within an industry through a trade association of compulsory membership. This part of the plan was necessary for the proposed interchange of worker benefits. But it had a further and much larger meaning as an agency for stabilizing industry by reducing its fluctuations. In this sense it is perhaps the most fundamental proposal for industrial coordination that has been advanced in years.

A look at its background is helpful: Thirty and forty years ago the losses from uncontrolled competition led first to secret agreements, pools and the like, then to combines and trusts. Later, when these organizations had been found objectionable and ineffective, the idea of controlling competition gave way to the concept of cooperation on non-competitive joint problems, and trade associations were formed. During the past two decades these associations have grown, have done much necessary work, and have proved their weakness by reason of real or fancied legal limitations on their work and by reason of inability to hold adequate support of their field. However, especially since the middle '20s, the trade association has come to be recognized as absolutely essential in dealing with the great number of problems and relations common to an entire industry. Until a new device for industry coordination is at hand, we must have trade associations. How, then, can they be made effective?

The question of legal limitations has yet to be worked out. Many believe that the needed degree of cooperation cannot be reached until the anti-trust laws are moderated, but others think that full cooperation is possible without approaching restraint of trade. Mr. Swope does not undertake to settle this matter. He deals with the other side of the problem—namely, the weakness that originates in lack of unity of the industry. To bring about unity he proposes to make membership in the trade association compulsory on all but the very small units of an industry. Unity once attained, the findings of the association would be clothed with authority—a full solution of most of their present problems.

When fully applied, such a system would departmentalize industry. Each branch or class would be brought to a unity of action comparable to that of a department of any business organization. After all, any one industry is nothing more or less than a department of the entire industrial structure, and is charged with performing certain definite functions in the community's industrial service. At present it performs these functions without teamwork—like an unorganized and wholly chaotic business department. Mr. Swope's plan would supply the teamwork.

It has been said by good authority that the evolution of industrial associations is the most significant event in twentieth century history. This may be overstatement, but it is worth quoting as merited emphasis on the importance of cooperation and coordination in industry. If we now have inadequate means for such coordination and if the Swope plan promises to create a better means, it is worth putting to practical trial at once. The construction industry stands to gain measurably by the extension of the trade association idea among the industries which supply it with materials and machines.

Building for Economy and Efficiency

Form derived from function in the unique structure of the McGraw-Hill publishing house in New York—Functional planning produces a structure adapted to highly exacting services at exceptionally low cost

By J. ANDRE FOUILHOUX
Of Hood & Fouilhoux, Architects, New York City

PLANNING the construction of a large publishing house introduces an unusual complexity of problems. The several departments and services require to be so placed and arranged as to render them individually efficient and at the same time coordinate them to suit their necessary interrelation. The dissimilar needs of editorial, business and printing units must be adequately provided for. Such conditions governed the planning of the McGraw-Hill Publishing Company's new home in midtown New York. In spite of the severe limitations which they imposed, exceptionally low cost was realized. At the same time a structure of decided architectural individuality was created, one whose form expresses function more clearly than possibly any other example of current office-building architecture.

Economy is so significant a characteristic of this building operation that the author is encouraged to review the elements of design, in order to point out the main architectural and structural factors responsible. This is done in the conviction that some features of the building will find application and acceptance elsewhere, as useful features of modern city buildings. The chief contributing factors of design economy may be stated thus:

(a) Efficient mass proportions: broad base and moderate height, which resulted in relatively small wall area per unit of inclosed volume and also minimized the problem of providing strength and stiffness; straight walls unbroken by courts and recesses; walls free from reveals and decorations.

(b) Efficient floor plan: service areas so grouped as to give a large ratio of net floor area with good daylighting everywhere (Fig. 3).

(c) Close adaptation of structure to function: floor areas determined by use requirements and wall structure determined by desire to get maximum daylighting.

(d) Simplicity of wall structure and finish, and omission of decorative additions.

(e) Adaptation of new materials in place of traditional materials of greater cost.

(f) Simple foundation structure due to presence of rock at shallow depth and provision of only one basement story.

(g) Omission of heating plant and purchase of steam from company providing it through street mains.

Operating against these were several factors which tended to produce high cost, chief among them the heavy floor loadings made necessary by the fact that the building is of manufacturing type, the provision of sprinklers throughout, and the desire to have high-speed elevators of most efficient type for best service to both manufacturing and office floors.

General Conditions of the Problem

Planning necessarily began with thorough study of the functions to be served and the conditions of the site. Space requirements called for a rather large volume and areas of about 24,000 sq.ft. net on at least

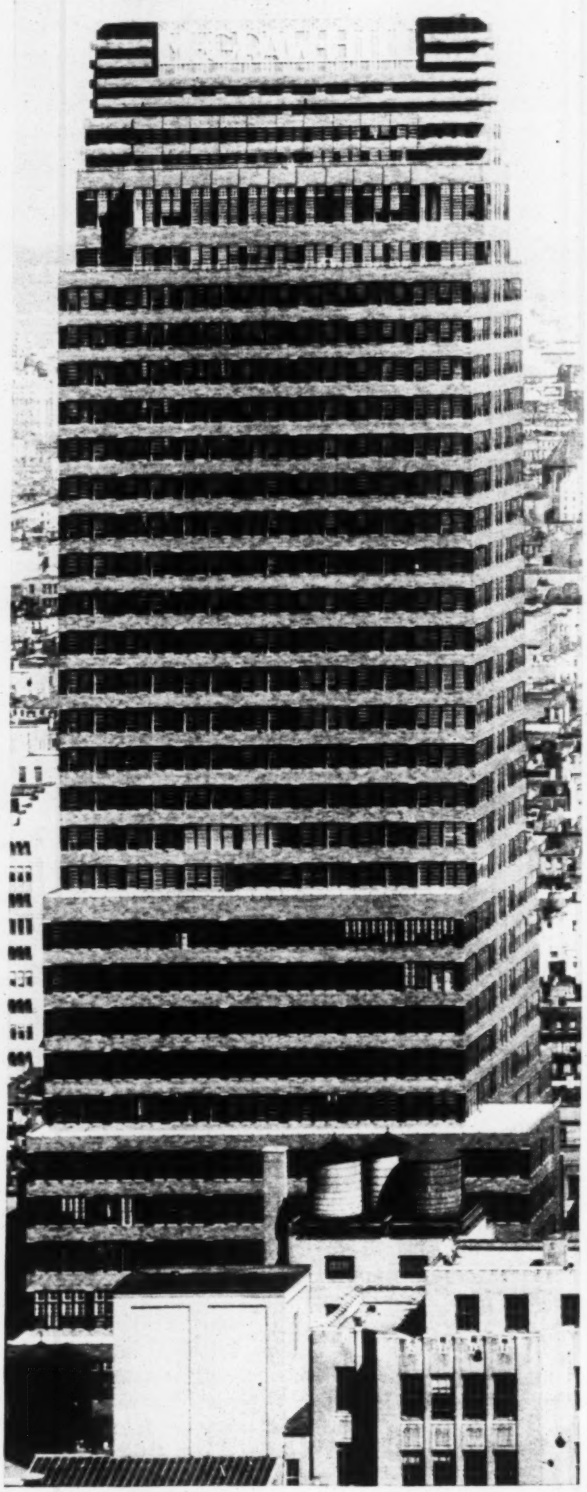


Fig. 1—New McGraw-Hill Building in New York introduces a modern trend in the wide use of new materials for economy, a simple wall design providing maximum glass areas and efficient floor layouts for a variety of occupancy requirements

some of the floors. A ground space of slightly more than one acre was available, the owner having purchased a site fronting on 42d St. about halfway between Eighth and Ninth Aves. and extending southward to 41st St.—about 230 ft. frontage by 197 ft. depth. This location being within 1,000 ft. of Times Square, which is the center of the midtown business district, it was essential that the building should possess architectural effectiveness of appearance and should be suitable for general office-building uses. However, neither owner nor architect desired the ornate effects usual in commercial office building construction; all parties concerned felt that clear expression of the functional character of the building would lead to the most effective result.

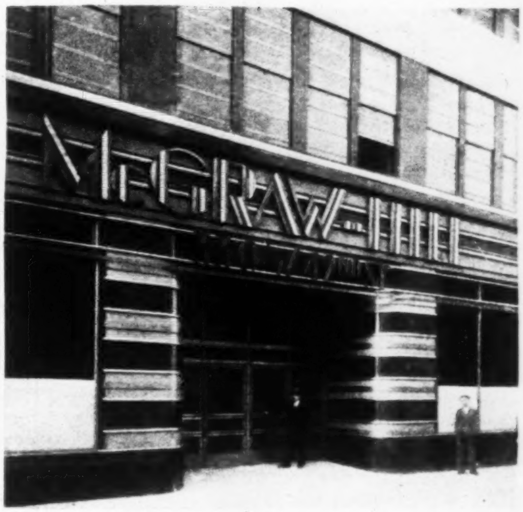

McGRAW-HILL

Fig. 2—Bands of brass, stainless steel strips and belts of enameled steel plates form walls of entrance and also comprise walls of main floor lobby

As to occupancy, the owner desired to house under one roof all his offices, as well as the composing room, print shop, plate foundry, engraving plant and other essential facilities of a publishing enterprise. These are to serve the editorial and publishing work of some 30 technical and business papers and of affiliated book-publishing enterprises. Thus a building of manufacturing classification was required, yet one providing a high type of office accommodation, free of disturbance by noise and vibration from the presses. Heavy floor loading and vibration-absorbing massiveness therefore had to be considered. For the manufacturing and some of the clerical departments, large continuous floor areas were desired, while the editorial requirements were adapted to small floors, as far as possible remote from street noise and dirt. Effective daylighting was important. The elevator and other intercommunication equipment had to be ample, rapid and flexible. Extensive freight receiving and shipping facilities were no less important than those for passenger accommodation.

Mass Arrangement

The plot of ground was larger than present needs required. One of the first decisions to make was what proportion of the plot should be occupied by the proposed building and what proportion should be left for future use. On the one hand sufficient area had to be apportioned to accommodate the largest department on one floor; study determined this to require (for both composing and press rooms) a floor area of about 24,000 sq.ft. net, or 27,000 sq.ft. gross, which could be provided by using only part of the site. On the other hand the remaining land had to be of adequate size for the erection of a future building. After full study of these conditions it was concluded that the building should have a frontage of 130 ft. on 42d St., with a depth of 197 ft., which is the distance between 41st and 42d Sts.

As the building fronted on two streets and the sides were assured of light protection, it was deemed best to make the four elevations uniform in design (Fig. 1). Economy, therefore, had to be exercised in deciding upon the construction and selecting the materials for these elevations.

Setback provisions as fixed by the city zoning law

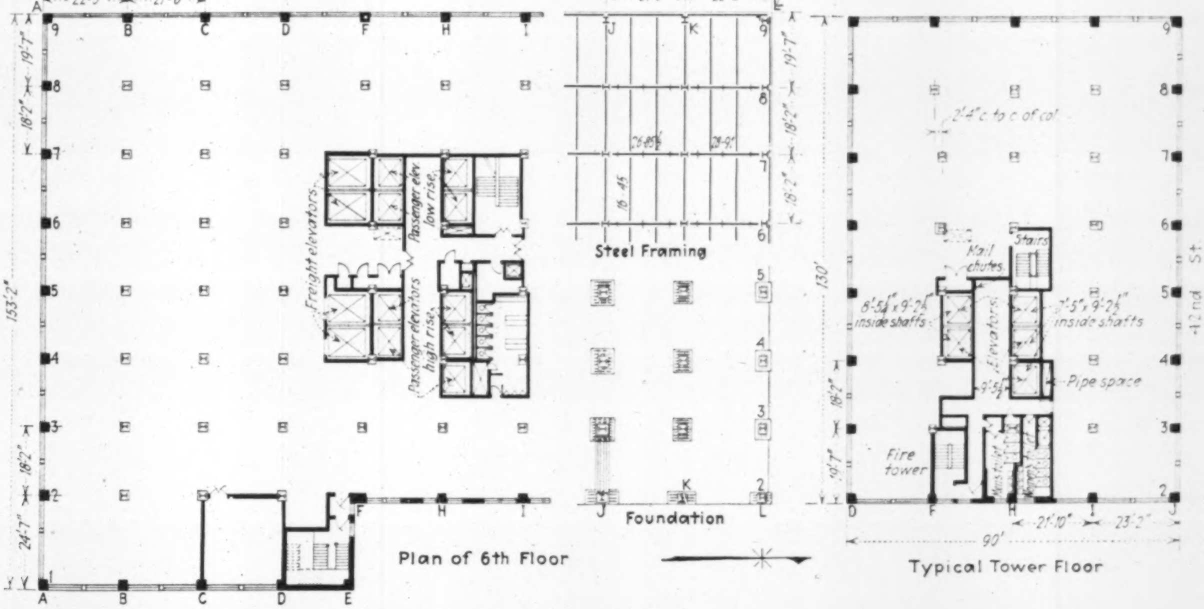

197'-4"
22'-5"
21'-6"
153'-2"
19'-7"
18'-2"
24'-7"
A
B
C
D
E
F
H
I
1
2
3
4
5
6
7
8
9
Freight elevators
Passenger elev. low rise
Passenger elevators high rise
Plan of 6th Floor
21'-8"
22'-8"
J
K
L
26-85½
28-91
16-45
Steel Framing
Foundation
130'
2'-4" c. to c. of col.
Mail chutes
Stairs
8'-5¼" x 9'-2½" inside shafts
7'-5" x 9'-2½" inside shafts
Elevators
9'-5½"
Pipe space
Fire tower
Men's toilet
Women's toilet
21'-10"
23'-2"
90'
42nd St.
Typical Tower Floor

Fig. 3—Large lower story floors and smaller tower floors resulting from setback laws serve efficiently the diverse requirements of mechanical operations and editorial and business offices

limited the dimensions of the upper part of the building and made it impossible to continue the walls of the two street faces higher than six stories on 41st St. and ten stories on 42d St. No setback limitations controlled the side walls, and as both sides were assured of light protection they were carried up vertically, with as full fenestration as the street fronts. Within the limiting lines thus defined, the desired volume of inclosed space could be provided in about 30 stories. Actually, the final planning worked out for 33 stories occupied, with machinery and tank spaces above.

Zoning Helped Planning of Building

In studying the relation between the service requirements of the different departments on the one hand and the setback and area limitations imposed by the zoning laws on the other, it was found that these harmonized very closely. Large floor areas were required in the lower stories, to house the printing and other mechanical departments; somewhat smaller areas were desirable next above, to accommodate large clerical groups; the upper section, for editorial and business offices, was best suited to considerably smaller areas, with maximum brightness and uniformity of daylight illumination. In fact, by shaping the mass outline as near as possible to the zoning-law outline, all use requirements were found to be met in full measure.

During this study of general plan, the location of the printing and other production machinery was considered very thoroughly. For satisfactory use of the office part of the building it was imperative that noise, tremor or vibration set up by this machinery should not be transmitted to other floors. Many existing printing buildings are unsatisfactory in this respect. But the experience of the author's firm in constructing the Daily News Building in New York two years ago, as well as observation of a number of recent successful newspaper buildings, gave proof that a thoroughly braced frame would not be subject to vibration, and it was concluded that if the reciprocating presses were not all aligned in the same direction there would be no trouble on this score.

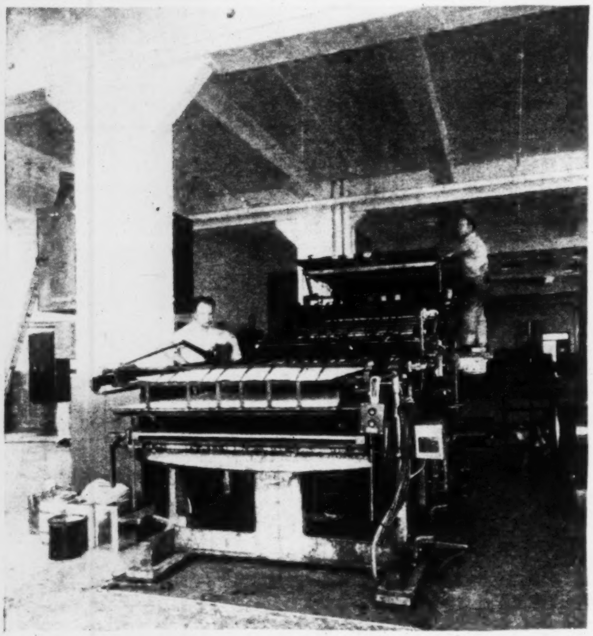


Fig. 4—Vibration is prevented or absorbed in the lower floors by mounting presses on pads of plank and cork, by placing deep kneebrackets at all beam-to-column connections and using an 8-in. cinder concrete floor

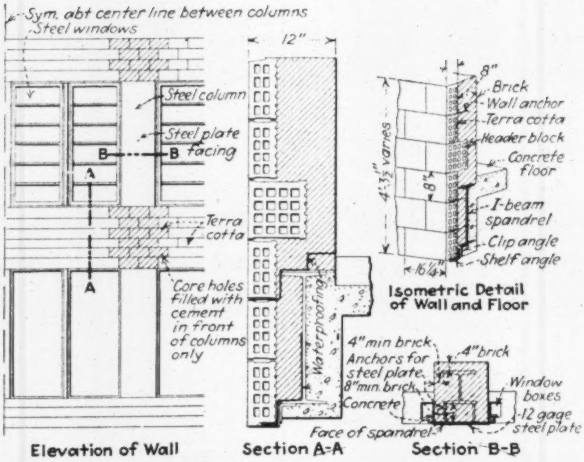


Fig. 5—Unique wall construction consists of alternate courses of blue terra cotta and steel sash and glass: economical, efficient, easily maintained and durable

Transmission of noise or tremor, it was believed, could be prevented by placing cushion pads under the press supports; experience has borne this out. The pads (Fig. 4) consist of a lower block of cork, ½ to 2 in. thick, bound by a steel band around the sides, and an upper block of wood, also 2 in. thick, set in the metal drip pan in which the machine stands. All machines except the linotypes are supported by such cushions. They are proving thoroughly effective.

Acoustical treatment of the ceilings in the printing floors would considerably reduce noise at the source and thereby give further assurance against transmission of noise through the building. It has been omitted at present but can easily be applied later if found necessary.

On these considerations it was decided that housing the mechanical plant in the same building with the offices was entirely practicable, and the further planning then developed as outlined.

All the Window Area Possible

Since good natural light was vital, it was clear from the beginning that windows would have to be closely spaced. In fact, if possible the windows should form continuous belts, of full height from sill level to ceiling. Narrow piers or masonry mullions between windows are expensive to build, because the material requires two finished faces and because the mason's work in building up the jambs is slow. Therefore, masonry piers were eliminated, and the windows were made continuous between columns.

A steel double-hung window of stock size and type was selected, and the steel mullions between windows were made part of the window construction. The building column itself was treated like an extra wide mullion, with a steel plate covering the fireproofing.

According to building regulations the filling between window heads and the sills of the story above must be of masonry and of specified thickness (12 in.). Many architects and builders feel that they should have a choice of any material in any thickness, provided it affords protection from the elements and stiffness to withstand wind pressure and insulates from heat and cold. But the code requirements of course had to be followed, which meant stone, brick, tile or concrete masonry.

Simplicity and Color

After many studies it was decided to have these spandrels form bands of color. Glazed terra cotta blocks were used for the exterior facing, backed up with brick. They are not more expensive than a good grade of face brick of the ordinary gray or buff variety, and their glazed surface will retain its color. These broad bands, set off against the wider bands formed by the continuous belts of window, gave the whole structure a definite horizontal articulation, in sharp contrast with the vertical articulation that characterizes most of our modern city building construction.

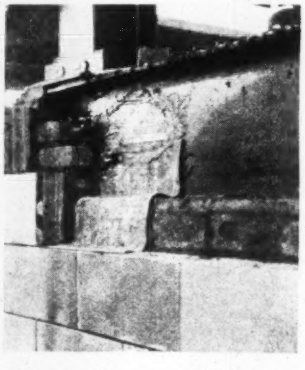


Fig. 6—Waterproof felt was built into the wall at each floor level in stepped arrangement to shed any leakage or seepage to the exterior face

Addition of further elements either vertical or horizontal, with expensive reveals or moldings, was avoided. The subsidiary features were developed to carry out the architectural effect. Thus, the window sash were divided into panels of the limiting size of glass area allowed by the building code, by horizontal muntins, which incidentally afforded more open view through the windows.

In short, the important architectural elements formed by the smooth bands of colored terra cotta spandrels are nothing more than the strict minimum requirement of the building regulations —namely, masonry filling between window heads and sills. The resulting simplicity of wall structure, joined to the simplicity of the mass outline, assured a large economy as compared with the cost of the decorative elements usually thought indispensable in the design of city buildings.

Simplicity was carried out also in the detail design of the walls. The windows were pushed out as close as possible to the outer face of the wall and no windowsills other than the lower members of the frames were used.

Without adding to the cost, the exterior design was completed by selection of the proper color for windowframes, mullions and sash, and for the window shades. The glazed terra cotta work is a greenish blue, the mullions and windowframe members are a deep Prussian blue, the sash apple green; the citron yellow window shades with which the building has been equipped have the middle half of their width also green.

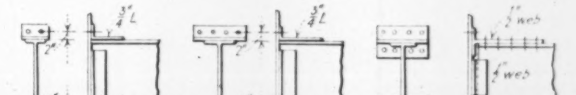
Sections of the wall construction (Fig. 5) indicate clearly the manner of using the terra cotta wall blocks with brick backing. The courses of the terra cotta blocks (8 in. high) are normally 4 in. thick, with 8-in. header courses to bind the facing thoroughly into the brick backing. For further bond each course is tied to the brickwork by 1x8-in. flat corrugated galvanized wall anchors, two per block. The exterior columns are incased in brickwork, which also is thoroughly bonded to the brickwork of the spandrels. All the masonry was laid in 1 : 3 cement mortar with an addition of 20 per cent of lime to the cement (or 0.20 : 1 : 3 mix), with careful filling of all joints to guard against leaks. At each floor level two layers of waterproof felt (Fig. 6) were built into the wall through its thickness, one above the steel spandrel beam and one at the bottom flange of the beam, in stepped arrangement to shed to the exterior any leakage or seepage.

That part of the spandrel terra cotta which is directly in front of the steel columns has vertical cells, filled with mortar during the laying to provide 8 in. of solid masonry outside the steelwork, required by code. Certain vertical piers in the east wall, the only departure from the normal wall construction, are built of smaller blocks (glazed brick) for better appearance.

Frame and Floor Structure

The manufacturing floors required deep spaces measured inward from the walls, the office floors shallow spaces (Fig. 3). These requirements fitted the setback and tower requirements of the zoning law very closely, as already indicated. Setbacks were carried to column lines, in order to avoid costly offsets in the steel framing. The office spaces were placed in the upper half of the building, where floor areas are smaller and conditions are most favorable as to lighting and freedom from noise and dust. The larger floors in the lower half of the building are given over to the mechanical departments and certain large clerical departments.

Quite flexible adaptation of the office floors to varied



or all int. col. above 2nd fl., N., S., E., and W.

For all int. col. from 27th to 32nd fl. incl., N., S., E., and W.

For all int. col. from 21st to 27th fl. incl., N., and S.

For all int. col. from 21st to 27th incl., E. and W.

For all int. col. from 9th to 20th fl. incl., N., S., E., and W.

Brackets for all int. col., 1st to 8th fl. incl. North-South-East and West

Fig. 7—Typical steel framing connections, McGraw-Hill Building, New York City

uses is practicable. Clerical forces can be arranged in continuous array from wall to wall. Where private offices are required, they can be provided along the outside walls, the center of the working space then being utilized for waiting rooms and filing space. In this connection, the location of the stairs, elevators and other service facilities may be studied (Fig. 3); as will be seen, these are grouped in a solid rectangular area in the middle of the continuous east wall of the building, so that the net available floor area extends in U-form around this space with full light, from north, west and south.

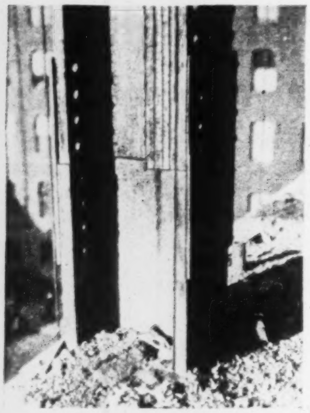


Fig. 8—Typical exterior column splice

Economy in the framing was achieved by placing the columns in a regular grid in both directions, all openings and utilities being fitted into this grid with least possible disturbance of its regularity. As to type of framing, steel was decided upon, in view of the large amount of operating machinery and the consequent need of a high degree of rigidity provided by bracing. An unusually large amount of kneebracing in the frame was provided in the machinery floors to prevent vibration. A typical kneebracket and other beam-to-column connections are shown in Fig. 7.

Beams and girders are carried by rolled-section columns, cover-plated as required. Maximum column load is 3,480,000 lb., which corresponds to that in the usual office building of about 50 stories. Flanges of wall columns are kept a constant distance of 8 in. inside the building line, offsets at splices occasioned by change in column section being made at the rear flanges. Keeping outside column faces back from building line permits spandrels to be rigidly connected to column flanges, an aid to wind resistance. All lintel angles are continuous on the face of the columns which assists in supporting spandrel facing. Beam-to-column connections in the lower eight stories consist of a deep seat bracket and a top angle connection. The only special steelwork occurs near the top of the building, where three trusses (one in either wall and one on the center line) one-story deep span 54 ft. east and west. Chords and all web members are rolled sections. Wind design of the building was by a modified cantilever method in which the shears and moments in the exterior columns were taken as nine-sixteenths of those on the interior columns. The steel design was executed by Lockwood, Greene, Engineers, Inc., R. V. Banta, chief engineer. W. J. Heiser was in immediate charge.

Because of machinery vibration, also, heavy slabs of cinder concrete were adopted as floor construction. They are flat slabs with top surfaces flush with top of steel, with mesh reinforcement looped over the girders, 8 in. in thickness in the machinery floors (for a loading of 250 lb. per sq.ft.) and 4 in. in the office floors (120 lb. per sq.ft.). Girder and beam fireproofing was formed and poured with the slab. The electrical conduits for the ceiling lights are embedded in the slab. To accommodate the wiring for floor-service power, telephones and signals, a lean cinder-concrete fill 3 in. deep was laid over the slab, and over this a 1-in. cement mortar floor finish treated with hardener. In the fill are embeded under-floor ducts for distributed outlets throughout the floor.

Roof House and Sign

At the top of the building, the 32d and 33d floors accommodate executive offices and a large assembly hall. To provide for the latter a series of three heavy trusses spans east and west, half the length of the 34th floor, supporting a roof house above. The space covered by these trusses is 69x72 ft., though for the present only part of this area is used to form the assembly hall. The roof house over the 33d story is merely the inclosure of the elevator machinery and of the water supply and sprinkler tanks. It consists of brick walls filling a light angle frame that supports the roof. Its north and south walls, however, are also utilized as the background of terra cotta letters outlining in color the name of the building. A roof sign would have been far more costly and less effective and permanent.

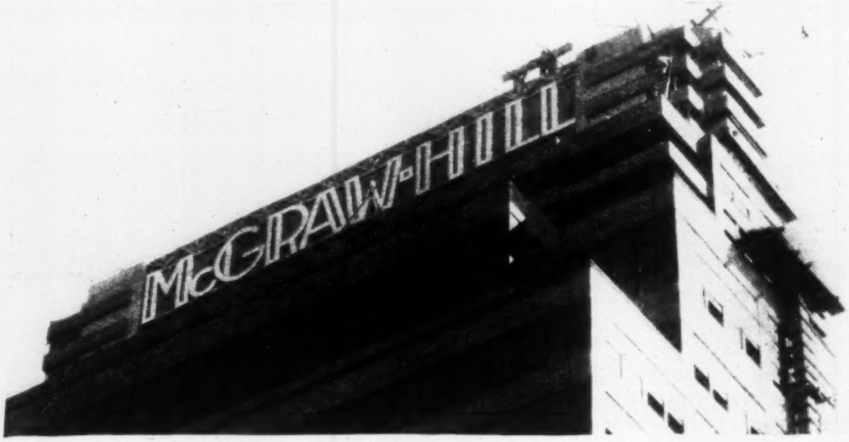


Fig. 9—Pent house inclosure is utilized as space for a terra cotta sign of name of building

Roofs of tankhouse and setbacks are surfaced with 1-in. tile bedded and jointed with cement mortar on three-ply felt waterproofing on 1-in. cork laid on the structural roof slab as heat insulation. All flashing is leaded copper; the roof flashing extends through the parapet wall, with an upward jog to assure bond. Copings are slate slabs anchored by blind dowels, bedded in cement mortar and jointed with mastic.

Elevator Arrangement

Studies were made of different possible elevator arrangements and of different types of elevators. Various groupings of elevators and elevator lobbies to serve the separate zones of the building were considered in

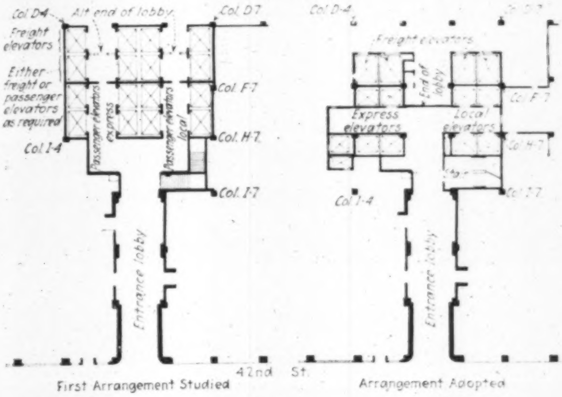


Fig. 10—Two of the elevator arrangements studied

their relation to the direct and intercommunication services required. The conclusion was reached that a smaller number of high-speed automatic elevators would give better service at lower cost of installation and operation than a larger number of slower manual-control elevators. Four low-rise cars (first to fifteenth floors) and five high-rise cars (one all-floor, four fifteenth to thirty-third floors) were adopted.

Four freight elevators are situated back of the passenger elevators; on the ground floor they open on a freight-handling lobby which communicates by a row of rolling doors with a shipping platform (Fig. 11) whose tailboard edge is about 30 ft. in from the south or 41st St. front of the building. This 30-ft. width serves as trucking space. A special lift was provided between the fifth and seventh stories, to connect the mechanical floors for transfer of forms of type, electroplates and the like between the composing and printing rooms and the plate foundry. A special elevator extending from basement to second floor serves the basement storage. A chute delivers packages from the fifth floor to the loading platform on the first floor. The entire transportation system formed by these facilities is highly adaptable, compact and efficient.

Some Dimensions and Quantities of the McGraw-Hill Building

Height of building	483 ft. 3 in.
Cube	8,057,000 cu.ft.
Gross area	580,760 sq.ft.
Net loft area	459,673 sq.ft.
Tons of steel	7,800
Number of windows	3,150, all double hung
Square feet of glass (¼-in. thick)	85,038 sq.ft.
Amount of radiation	81,495 sq.ft.
Number of sprinkler heads	8,000

Sprinkler tanks at roof:
20,000-gal. split gravity tank, 14x12x17 ft. high; 2, 5,000-gal pressure tanks, 6 ft. diameter by 25 ft. 6 in. long.
Sprinkler tanks at 15th floor:
2, 17,500-gal. gravity tanks, 16 ft. 3 in. by 15 ft. 9 in. by 10 ft. high.
Fill pump for sprinkler tanks, 80 g.p.m.
2, high-level house pumps (basement), 150 g.p.m.
2, low-level house pumps (basement), 250 g.p.m.
Fire pump (basement), 750 g.p.m. } Standpipe system
Fire pump (15th floor), 750 g.p.m. }
Fire and house tank (roof):
8,500-gal. capacity (5,000-gal. house supply and 3,500 gal. fire reserve); size 8x12 ft. by 13 ft. high.
Fire and house tank (16th floor):
12,000-gal. capacity (7,000 gal. house supply and 5,000 gal. fire reserve); size, 18x13 ft. by 8 ft. high.
Standpipe fire pump, suction tank (basement):
12,000 gal. capacity (fire reserve); size, 18x9 ft. by 10 ft. 6 in. high.
Insulation under presses, natural cork of ½ to 2 in. in thickness, depending upon weight of press. Edges of cork are bound by steel bands to prevent spreading.

With further eye to economy, the full possibilities of elevator requirements were not provided, but framing has been put in for additional elevators both alongside the present bank of elevators and along the west wall of the building—the latter to provide for possible future extension of the building.

Operating speeds up to 800 ft. per minute are provided by the elevator machinery. This speed was used even during the construction period, as the smoothness of acceleration and retardation produced by the special speed-control elements of the installation made it practicable and safe.

Radiators and Ducts

Special study was made of the radiators and the piping layout. In the manufacturing floors the risers are exposed, but being located directly back of the mullions they are not obtrusive. In the office floors these pipes are concealed by furring and plastering. For the sake of economy, one unit of radiation is provided for a group of windows, but provisions are made in the branch piping so that the unit can be easily split in the future, in case of office subdivision.

The system of underfloor ducts for high-tension and low-tension wires has been embedded in the thickness of the floor fill, with outlets spaced at 2-ft. intervals along each duct, so that a sufficient amount of wiring will be available for all future contingencies in the way of demands for electrical connections.

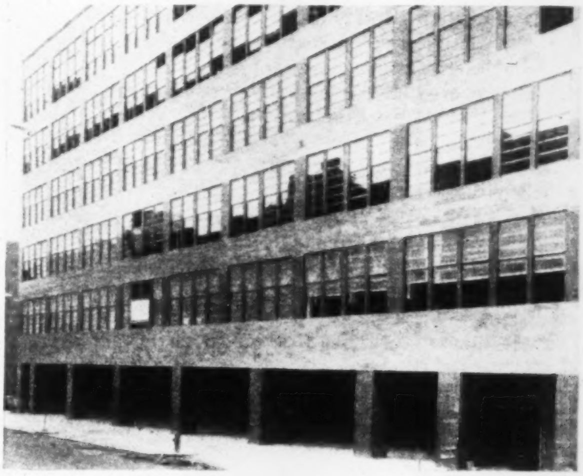


Fig. 11—Truck entrance to shipping platform on 41st St. side of building

Sprinklers have been installed in all stories. This practice is not usual in buildings approaching 500 ft. in height, and in fact it is believed that the McGraw-Hill Building is the highest sprinklered structure yet built. Because of the large pressures in the piping in case a single supply tank were used, the system was divided into two zones, served by tanks in the sixteenth story and the roof tankhouse.

Interior finish in the manufacturing stories is mill-white paint on the concrete of ceiling and interior columns, the brickwork of the exterior columns and spandrels, and the hollow-tile partitions of stairways. Other partitions are plastered on tile, and the plaster is painted. In the office stories all wall and ceiling surfaces are plastered and painted light green. Hung ceilings are used only in the 32d and 33d stories, which contain the executive offices, and in the transfer pipe floors; elsewhere the sprinkler and steam piping is exposed.

Cooperation of Builder With Architect and Owner for Economy in Building

All planning and construction problems of McGraw-Hill Building were worked out by joint conferences from beginning of enterprise —The system reduces costs, permits most favorable purchasing, eliminates delays and produces the most satisfactory structure

By ANDREW J. EKEN
Vice-President, Starrett Brothers & Eken, Builders, New York City

PROMINENT as the McGraw-Hill Building is, through its location, size and design, it is more prominent still as one of the first examples of a modern and effiicent approach to both the design and the construction of a large building.

The building industry has, in some respects, failed to keep pace with the progress made in other industries and is probably the only large industry wherein designs are made and the finished product is brought forth without the close collaboration of the planning, cost-analysis and production branches of the business. This is largely the procedure in designing the average business building today, where there is little in the way of accurate cost data available to the designer during that stage of the planning when the most important decisions must be made.

The McGraw-Hill Building is not only, in the opinion of the owners, a highly satisfactory solution of their problem but, in the opinion of the architect and the builder, a record for low cost as well as quality of construction. This result is due essentially to close cooperation of all the parties from the first beginning of planning. The enterprise throughout was marked out in the light of the best knowledge that the several parties were able to contribute from their separate points of vantage.

The problem of planning was most difficult, and its widely different phases were not easily brought into harmony. Working alone, the architect would therefore have been involved in many serious uncertainties. The building was to house a large printing establishment of the owner and numerous independent allied businesses. In addition thereto the vast technical, editorial and business organizations engaged in producing the many McGraw-Hill technical journals were to have their offices here. Space had to be provided for the future expansion of both the manufacturing and the technical branches of the business without interference in their work, and this additional space had to be of a character readily rentable in the interim. All of this had to be produced at a price that would not increase the overhead already determined.

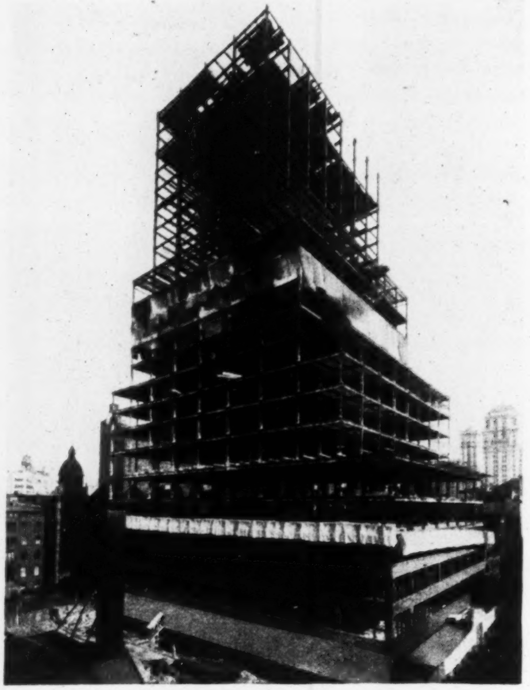


Fig. 1—Simple steel frame and novel wall construction contributed to rapid progress made on McGraw-Hill Building

View taken Feb. 26, 1931 (foundations were begun Oct. 10, 1930), shows vacant part of plot in which all "ground operations" of the building program were carried on.

LOG OF CONSTRUCTION, McGRAW-HILL BUILDING

Excavation begun	Oct. 10, 1930
First column set	Dec. 22, 1930
Floor slab begun	Jan. 12, 1931
Brickwork begun	Jan. 22, 1931
Terra cotta begun	Feb. 24, 1931
Steel frame completed	April 8, 1931
First elevator operating	April 8, 1931
Floor slab completed	April 17, 1931
Walls and windows completed	May 18, 1931
First printing press operating	July 29, 1931
Final certificate of occupancy obtained	Sept. 30, 1931

With these problems before him, the owner decided not only to employ his architect but at the same time to bring into the group a builder and a real estate authority. To this end he employed Hood & Fouilhoux as architects, Starrett Brothers & Eken, Inc., as builders, and Brown, Wheelock, Harris, Vought & Co., as consultants in questions of real estate and renting. These firms, with a committee of the owning company, headed by James H. McGraw, Jr., formed a permanent conference group for the study of the problem.

Budget Control

As its first work the conference group produced a budget within which the work had to be (and was) carried out. With the budget determined, the architects commenced their planning.

Because of the proposed divergent occupancy of the building and the need to house all users without conflict, various special constructions had to be devised in addition to the preparation of a large number of alternate plans. In all plans cost studies were required to insure that the budget would be maintained. As an instance of the problems, the printing, binding and manufacturing business had to be housed in a way to insure entire lack of vibration in the building, which would seriously interfere with the renting of space.

Cost studies were made not only of the various parts of the building and of many alternate designs and methods of construction but of concrete and steel frame construction. With more than 30 stories of height, with the heavy loading demanded by the service of the building and with the necessity for simple windbracing to limit vibration, the advantage of effectiveness as well as cost rested with the steel frame, which was adopted.

While great attention was given to cost study of all details as the planning proceeded, the character of both construction and mechanical equipment was at all times held to the highest levels. Particular instances are the large layout of full signal-control elevators, and the fact that few office buildings in the city are designed for such a high wattage per square foot of floor space.

A description of the plan and equipment of the building has already been given by J. A. Fouilhoux, but special attention may be called to the novel and original wall treatment by the architects in the main hall and elevator lobbies. The wall surfaces from floor to ceiling are in heavy furniture steel with an enamel finish, depending on bronze members and stainless steel strips for design and relief. The design is extremely effective, seems particularly expressive of the technical character of the owner's publications, has elicited a great deal of favorable comment and is gratifyingly economical as compared with the average marble wall treatment.

What the Cooperative System Did

The cooperative method of creating a building is in sharp contrast to the old plan of building upon competitive bids received after designs are completed. The old system deprives both designer and owner of the benefit of the builder's knowledge of cost and construction, and sharply aligns the builder's every interest against the interests of the owner. Under the cooperative method the builder's interests are identical with those of the owner.

With the builder's cost department an important factor in the designing and with a budget established, the work may be started without awaiting the completion of plans, thereby saving greatly in time and the attendant carrying charges. This plan of procedure also makes possible economies by taking advantage of the varying price conditions of the market and by making it possible to utilize materials in which there have been price declines out of line with the price of other materials.

One of the questions which every architect and owner encounters and which is most difficult of answer is that of the economical height of the proposed building. The conditions vary with every building, site and time. The line of diminishing returns can be scientifically determined only through careful cost studies by an experienced organization whose interests are identical with those of the owner. Many of the details of the McGraw-Hill Building were the results of numerous cost studies, as witness the cinder-concrete arches 8 in. deep, adopted to provide sufficient dead air space in the slabs to damp out the vibration of the printing presses. This construction, chosen after careful cost studies, accomplished the purpose at a minimum of cost. Again, it was found that by increasing the speed of elevator cars, using power-operated doors and full signal-control elevators, better elevator service resulted at no additional cost but with a saving of floor space.

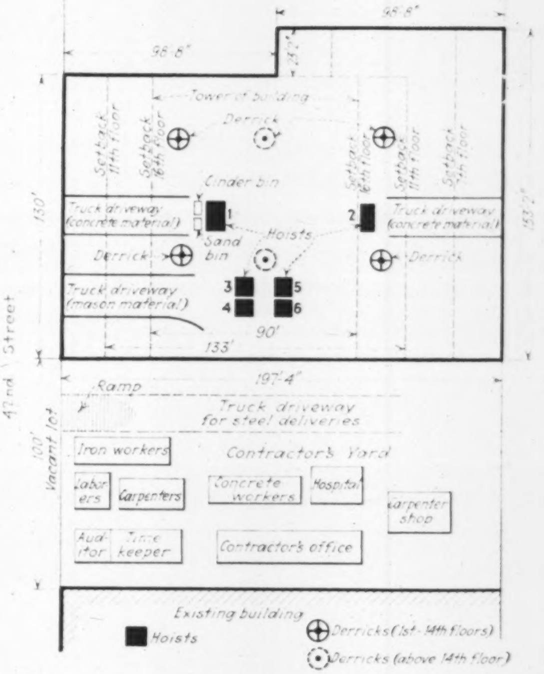


Fig. 2—Contractor's plant layout permitted all operations to be carried on within lines of plot, thus keeping 42d and 41st Sts. clear and safe for traffic and pedestrians

Other instances might be cited of the effectiveness of the system, but the most forcible evidence of its success is the satisfaction of architect and owner and the character of the resulting building.

Four Results

In general, four results are attained through the cooperative method of planning and building: (1) low cost, (2) favorable purchasing and subcontracting, (3) rapid construction and avoidance of delays, and (4) a satisfactory structure. These results were realized fully in the construction of the McGraw-Hill Building.

Cost—In respect to cost, the system of cooperative planning in which the builder is the agent of the owner puts every decision to test as to desirability, cost and construction time before it is acted upon. This full and authoritative weighing of costs—not only direct but also consequent cost—is the means of making every expenditure efficient; in other words, producing the desired result at lowest cost. Two instances of its value may be mentioned.

In the study of wall construction, whose novel character has been discussed by Mr. Fouilhoux, the question of relative costs of different facing materials was vital. At the same time the result that would be obtained had to be made sure: that the wall would be weathertight, thoroughly strong and well bonded, durable and easy to maintain, and that the method adopted would not cause delay or interruptions in the work. During the discussion of the wall problem each of these questions was analyzed not only in the light of the architect's knowledge but also in the light of the builder's and craftsman's experience. Thorough data on material and labor costs and effect on construction schedules were presented by the builder. As a result the decision in favor of glazed terra cotta belts and steel plate, as used, was reached in full knowledge that it would give lowest cost and best service.

A second case is that of the floor construction already mentioned. Not only strength and vibration-proof character had to be considered but also adaptability to most rapid progress of construction, least interference with other trades and greatest cost economy. Again the decision depended in an important degree on knowledge contributed by the builder.

Purchasing—By reason of the extensive purchasing and subcontracting organization of the builder and its close contact with current price conditions in the material and contract market, the builder was enabled to influence a large number of elements of the planning in the interests of economy. This influence proved advantageous in a great number of items of the planning and construction, among them the purchase of the steel, determination of whether it was best to buy the steel erected or delivered, purchase and handling of the brick, etc.

Elimination of Delays—Every step in the enterprise, of course, considered the time schedule as fully as the budget, and so was planned for avoidance of delays. Many decisions that, if made by the architect and owner, would have caused possible delays in the field were in this case made with full foreknowledge of their relation to schedule dates. But the most important effect of the cooperative system was that it took care of decisions that could not be made until a late stage of the work, as is inevitable in a complex undertaking of this character.

Since the builder was fully informed of the points left undetermined, he could plan his work so as to provide in advance for the delayed decision; also, he was in a position to advise owner and architect of the extra cost that a specific delay in deciding would involve. He was able to adjust his work to changes of plan with least disturbance to the work and without delaying operations until a dispute over extras had been settled. For example, when at an early stage of the masonry work a change in the wall effect was desired by owner and architect, the builder was able to give an immediate figure of the cost involved and was then able to proceed with the change instantaneously; the result was that the masons were set back only two days, whereas under the usual system a similar change would doubtless have caused weeks of delay.

Quality of Construction—Where the owner and the builder have identical interests, as under this system, the attainment of best excellence of construction at lowest cost is the natural and in fact inevitable result. Moreover the builder is in a position to suggest methods of construction that bear closely on the details of the architect's designs. Knowing the craftsmanship he has at his command, he can assure entire adequacy of result by the simplest forms of construction, instead of requiring the architect to plan the most elaborate construction as the only assured means of getting the desired result.

In the present case this service was notably important in the wall design, previously referred to. It was hardly less important in many other details of the building.

It will be plain that each of these four factors is intimately related to the success of the building operation, and that through them the best structure is obtained at lowest cost and in quickest time.

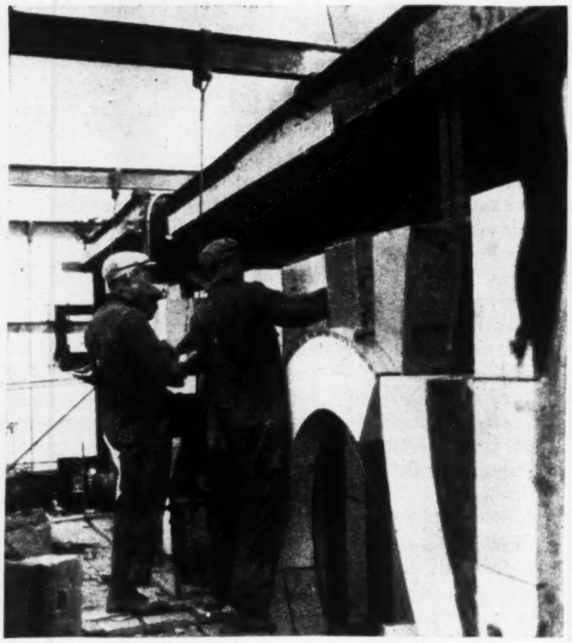


Fig. 3—Inclosing tank house in terra cotta sign backed with brick an example of efficient utilization of materials

As to Competition

The criticism of this method of procedure is sometimes made that it eliminates the benefit of competition. Quite the reverse of this is the case. It is to be noted that more than 70 per cent of all the work on the average building is covered by subcontracts, and that of the remaining 30 per cent one-half is represented by the materials purchased by the general contractor for his own work. We therefore have competition on 85 per cent of the work.

One of the important functions of the builder is that of acting as a buyer for the owner. Under the old method of competitive bids by builders, this buyer is put in the position of a vendor, and when the work has been awarded to him he must look primarily to his own interests and not to the quality of the material which he is buying for the owner's account.

To summarize, there are many advantages accruing to both the owner and the architect through this system, but in all probability the greatest advantage is that it brings to bear upon the problem the builder's expert knowledge of construction together with the only authentic source of cost information. With cost studies constantly available to the designer, he is in a position to proceed most intelligently with his work, and neither he nor the owner finds himself, at the completion of the plan, with a project the cost of which far exceeds his expectations. The completion of the McGraw-Hill Building at remarkably low cost, in a time of less than twelve months and to the satisfaction alike of owner and architect is a noteworthy demonstration of its effectiveness. As Raymond Hood, of the architects, recently stated: "The building is almost completed, and we still are friends with the owner!" The builders are able to make the same statement, in proof of the merits of the cooperative method of building.

Planning Elevators for Special Service

Plant for vertical transportation in the new McGraw-Hill Building is governed by unusually diverse traffic requirements—High over-all speed of handling passengers makes for efficiency, while smooth operation is obtained through a perfected control and extra heavy guide rails

By C. F. SCOTT
Gurney Elevator Co., New York City

ELEVATORS, which are the heart of the tall building, must be fitted very precisely to the character of the traffic resulting from the occupancy and use of the building. In the new McGraw-Hill Building highly diverse occupancy imposed very specific traffic problems, and as a result the design of the elevator system was an unusual problem. A combination of different services, all of them highly exacting, had to be provided in minimum space. The plant that was worked out in response to this demand is of large capacity, high speed and flexible adaptation to the varied service.

Diversified Traffic

How the elevator layout was developed has been mentioned by the architects in a previous article. To review the governing conditions, however, it should be said that the installation has to provide for a combination of regular office-building traffic, concentrated single-occupancy traffic, a large amount of interfloor (interdepartment) traffic, heavy freight traffic and a large daily incoming and outgoing mail, much of it very bulky. Part of this movement of passengers and freight could be estimated closely, but part was obviously indeterminate. Provision had to be made for any reasonable future development.

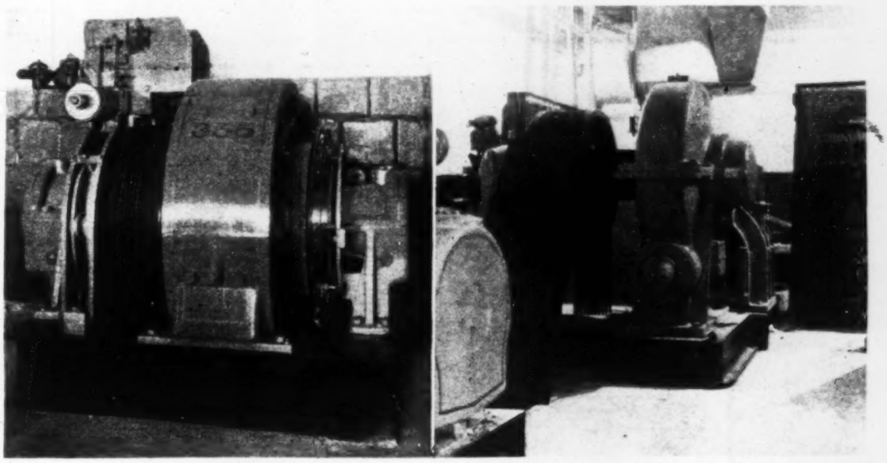


Fig. 1—Passenger and freight-elevator machines in McGraw-Hill Building

In the gearless machines (left) that run the high-rise passenger elevators at a speed of 800 ft. per minute, the motor armature and traction sheave are a single unit. The 6,000-lb. freight elevator machine (right) utilizes a worm-and-gear traction.

Elevator Distribution—Fourteen main cars and a type lift, the latter built by the Elevator Supplies Co., constitute the entire installation. The following data refer to the main car equipment:

No.	Service	Live-Load, Lb.	Speed, Ft./Min.	Length of Run Floors
5	High-rise passenger	3,500	800	1st-33d
4	Low-rise passenger	3,500	600	1st-15th
2	Freight	6,000	300	1st-15th
2	Freight	8,000	250	1st-9th
1	Freight	4,000	50	B'mt-2nd

As to arrangement, the passenger elevators are in two banks, occupying the sides of two cross-lobbies at the end of the main entrance lobby. The freight cars, directly behind the rear row of passenger elevators, open on a freight corridor on the ground floor and directly into the manufacturing space on the upper floors.

One of the high-rise passenger cars can be used for night service, making all stops. This car may also be used at times for mail. Many of the workers on the lower floors will use the freight elevators, which are really heavy-capacity passenger elevators, and thus relieve the regular passenger cars.

The nine passenger cars are all large, 3,500 lb. (23 passengers) capacity, size 7 ft. 4 in. by 6 ft. 4 in., with openings 3 ft. 8 in. wide, an ideal size and proportion.

Type of Control

The high-rise cars, running at 800 ft. per minute, are equipped with automatic control. Every effort was made in the design of the system to keep the time loss at each stop to a minimum. In this way the cars are enabled to make a round trip, with many stops in the fewest number of seconds. The cars are fitted with biparting doors, which open automatically as the car stops and close automatically when the operator moves his lever to start. The shaft doors, however, are opened manually, in the interests of simplicity and economy, though they close automatically. The door closers permit of opening in substantially the time taken by power openers. The automatic operators on the cab doors are a compact, inclosed motor-driven linkage.

The low-rise passenger cars, running at 600 ft. per minute, are equipped for manual operation, with automatic leveling. For the character of traffic and the large number of stops, and the short run, this combination of speed and control worked out as the most economical and is at no sacrifice of service. The high rates of acceleration and retardation, the rapid action in making level landings and the fast landing door movement give a low over-all trip time. These cars are fitted with

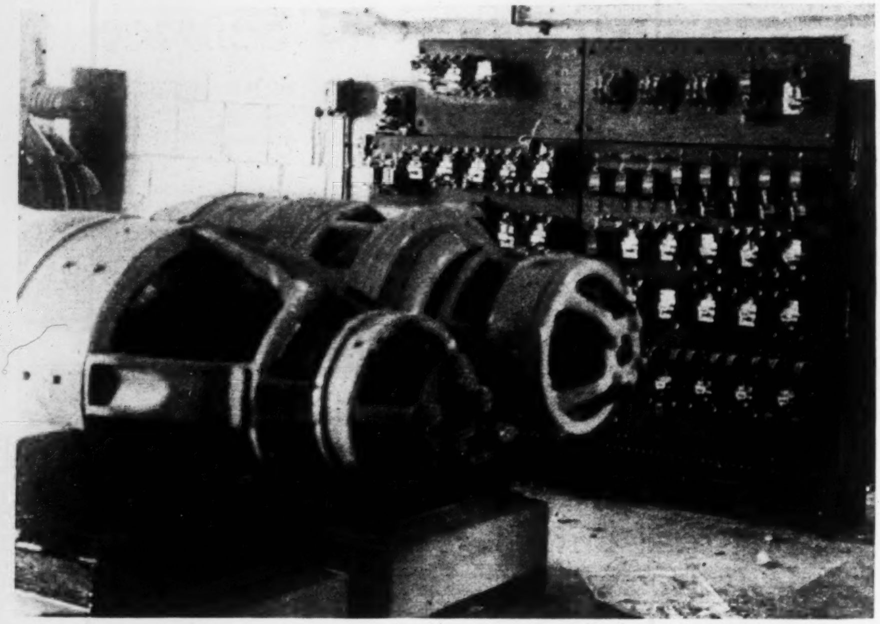


Fig. 2—Important part of controller mechanism is a new "damping motor" (top left on controller panel) that governs rate of building up and decay of magnetic field of generator, assuring smooth acceleration and retardation of car

folding gates. All the passenger machines are of the gearless direct-drive traction type.

The high-rise cars are run on 22½-lb. main guides. This is a new rail section, first used in the present building. Hitherto, passenger cars have run on 15-lb. rails, even in the highest buildings. The new heavy section results in remarkably smooth riding qualities, with unprecedented absence of side sway, vibration or small noise. The use of this heavy rail on high-speed elevators may be compared to the advent of the 125-lb. rail on steam railroads.

The generators embody an automatic speed regulator that keeps the elevators up to schedule speed at all loads, and the controllers have automatic acceleration and retardation control which makes possible high rates of acceleration without discomfort to passengers, and is thus a great time saver. In addition some novel control schemes are embodied to make the final retardation uniform and the final stop smoother.

How Smooth Operation Is Assured

Smoothness of performance of an elevator is compounded of four parts: acceleration, steady running, retardation, final stop.

Acceleration is controlled by the magnetic constants of the variable-voltage generator, but this in turn is controlled by a new and interesting device: a "damping motor," which is a small motor (¼ hp.) connected across the generator field and carrying a flywheel but doing no work aside from accelerating the flywheel. This motor acts as an automatic bypass to control the rate of building up of the magnetic field of the generator after a voltage has been applied to the terminals of the generator field winding. Retardation is controlled in the same manner, the damping motor this time becoming a generator and helping to retard the decay of the magnetism in the generator field after voltage has been removed from the generator field winding. Other factors of the control contribute to influence both the acceleration and retardation, so as to make it very rapid and at the same time pass through such a rate of change that the physiological reaction of the passenger is not uncomfortable.

The signal machine also contributes to smooth retardation because of its accuracy. An inaccurate machine requires frequent corrective influence from the leveling system, and while this produces no discomfort it causes a departure from the theoretically correct velocity-distance curve passed through by the elevator in retarding and stopping when a perfect stop is made.

Smoothness of steady running depends largely on a good rail job. The heavy rails used on the high-rise cars give a more rigid and substantial track on which to run, and are free from vibrations that would tend to be magnified as the car passes up and down the hatchway. The heavy rails, heavy supports and fishplates, and care in adjustment and finish, are thoroughly justified by the resulting remarkable smoothness of operation.

Smoothness of final stop is due to a smooth and very powerful brake, and to retarding the car practically to a standstill dynamically before the brake is applied.

Leveling System

The action of the leveling device may be best described by visualizing the action of the car as it slows down

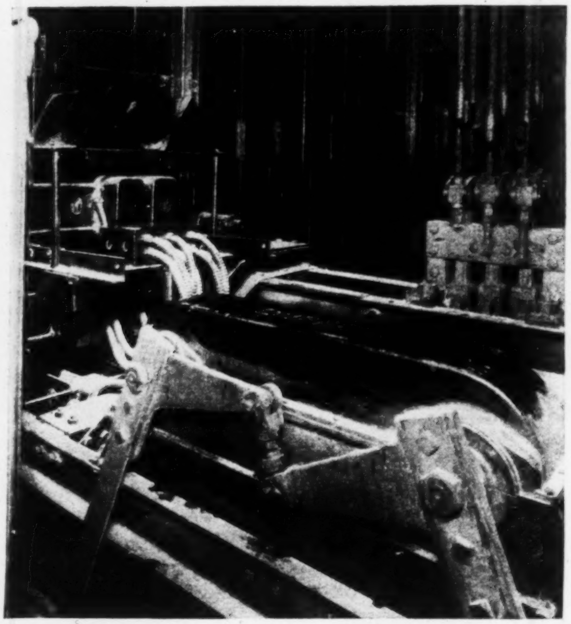


Fig. 3—Automatic door-operating mechanism (foreground), cable equalizer (right background) and cases for pliotrons (left background), which are thermion vacuum tubes that play an important part in leveling the car at a floor stop, all shown on top of a high-rise passenger car

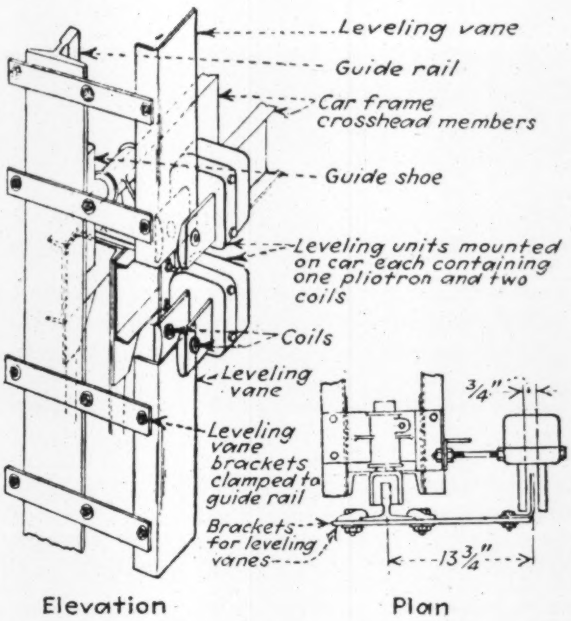

Leveling vane
Guide rail
Car frame crosshead members
Guide shoe
Leveling units mounted on car each containing one pliotron and two coils
Coils
Leveling vane
Leveling vane brackets clamped to guide rail
Brackets for leveling vanes
3/4"
13 3/4"
Elevation
Plan

Fig. 4—Pliotron floor-leveling mechanism

preparatory to making a stop. If the retarding force were always exactly the same, and if the momentum of the car at the moment the retarding force is applied were always the same, and if there were no variation in friction in any part of the system, then the car would always reach a certain very low velocity at a certain number of inches from the floor level (call it point *A*), a certain lower velocity at a point still nearer (call it point *B*), and come to rest precisely at floor level.

Since the above-mentioned factors are not always the same, however, it is necessary to have a corrective influence operating on the controller to bring the car in level with the floor, as otherwise it would sometimes stop above it or below. This corrective influence is the leveling device. It acts as a means of producing certain action on the elevator controller in the overhead machine room when the elevator car reaches points *A* and *B* in the hoistway. If the speed is a little too low at point *A*, the car is not allowed to stop before it reaches the floor but is carried on to point *B*, when power is finally cut off and the brake applied, stopping with the platform just level with the floor. If the speed is too high at point *A*, the momentum of the car will carry it past the floor level and as soon as a point a little beyond floor level is reached (call it point *C*) the power is reversed; the elevator then stops and moves back to point *C*, where power is cut off again, the brake applied, and the car stopped level with the floor. There are actually more than two of these corrective points in the elevator mechanism; what has been said of points *A* and *B* is typical of all.

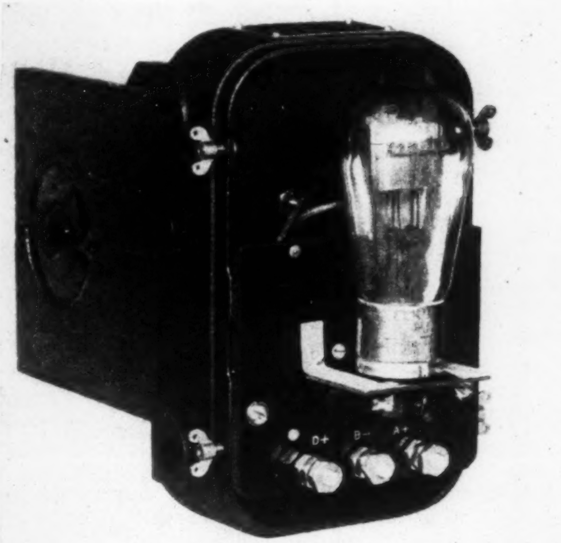


Fig. 5—Thermion vacuum tubes called pliotrons, carried on top of cars, are the heart of the leveling system and eliminate necessity for any metallic contacts in the electrical circuit

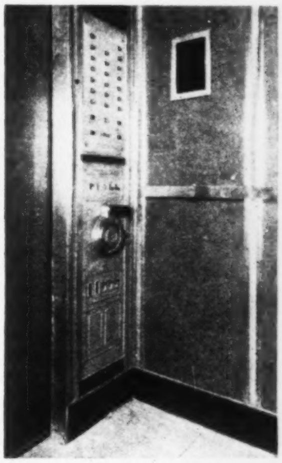


Fig. 6—Operator's control panel in car carries handle for closing doors and starting car and buttons for setting up floor stops as passengers call their floors

To carry out this action thermion vacuum tubes, called pliotrons, are carried on the car and move with it. Their grid and plate circuits are carried through coils which are placed in physical opposition, spaced about an inch apart. Stationary metal vanes fixed in the hoistway pass between the coils as the car moves by, and when the car is about to make a stop they damp the oscillations in the plate circuit so that its current rises sufficiently to operate a relay on the controller which causes the desired controller action. The response is very fast, all happening while the car moves a fraction of an inch after the edge of the vane comes opposite the center line of the coils. Because of its speed it is accurate. There are no contacts made or broken, and no moving parts.

Before the leveling system acts, the high-speed cars (which have automatic operation) are slowed down by the signal machines, or floor selectors, which are mounted on a level below the machine room. These selectors determine the precise point in the hoistway at which a car shall begin to slow down, preparatory to stopping, after a button has been pressed to register a stop call, in the car or on the landings. When the selector has slowed the car down, it is the pliotron leveling device that brings it to final stop.

The freight elevators are in two groups of two each, one group serving the tenth floor and below, and the other all floors to the fifteenth. The higher-rise group cars are 7 ft. 4 in. x 9 ft. 8 in. and carry 6,000 lb. at 300 ft. per minute, and the lower-rise cars, which accommodate the printing departments, are 7 ft. 8 in. x 10 ft. 5 in. and carry 8,000 lb. at 250 ft. per minute. All these cars are manually operated, with automatic leveling devices. The machines are of worm-and-gear type with variable-voltage control. A 4,000-lb. freight elevator, with a speed of 50 ft. per minute, serves from the basement to the second floor. Its control is the push-button type requiring no operator.

Fantail Chip Spreader Speeds Surface Treatment

Homemade spreader cost only $37—A 2½x8½-ft. plate, 78 ft. of small angles and 12 ft. of chain all materials required—Two spreaders and six 3-ton trucks handle 300 tons a day

By J. R. McDERMOTT
District Engineer, State Road Commission, Keyser, W. Va.

CHIP SPREADING in surface-treating roads presents an always irritating problem to the highway engineer. Spreading by men with shovels is slow and expensive in proportion to the volumes handled and is out of step with the fast machine processes of shaping the road surface and applying the bituminous material. Operating difficulties arising particularly from the desirability of not traveling on the oil or tar until they are covered have discouraged mechanical spreading. The notably successful chip-spreading device and procedure being employed this year in West Virginia are therefore given more than ordinary space in the article which follows. —EDITOR.

DURING last winter the writer became interested in the development of a simple, inexpensive and efficient means for the mechanical application of mineral cover to the considerable area of macadam surface treatment which was in prospect in the current season's maintenance program. It was desired to use the chip spreader with a fleet of pneumatic-tired dump trucks of one make, model and body style. The bodies had an inside width of 6 ft. with square corners between floor and sides, and the subframe members were 5-in. I's spaced 31 in. web to web. It was obvious that the receiving end of the spreader should be the width of the truck bodies, and that the discharge end should be of such width as would satisfactorily distribute cover coat on a 9-ft. width of surface treatment, as it was proposed to carry on the oiling in the single-traffic-lane manner. The fantail spreader (Fig. 1) built for the purpose at the district shops consisted essentially of a thin metal plate divided into diverging vanes and properly attached to and supported on the rear end of the truck body.

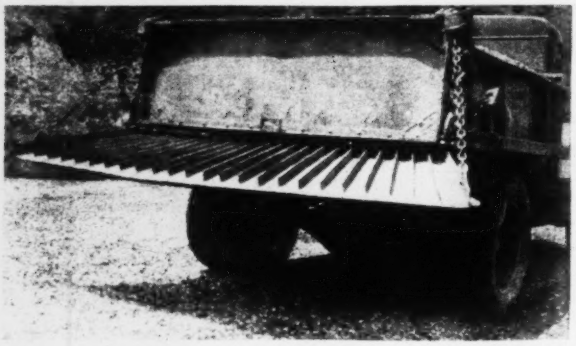


Fig. 1—Close view of fantail spreader on truck

Construction of Spreader

A flat steel plate ⅛ in. thick was cut to the required shape, 6 ft. long on one edge, 8½ ft. long on the opposite edge and 30 in. wide between edges. The surface was divided into vanes by means of 1½x2-in. angles electric welded to the plate, the 2-in. leg of the angle being upturned (1½x2-in. T-bars would have served even better, but were not commercially obtainable without considerable delay). In all, 24 vanes were formed, each vane 3 in. wide at the narrow edge of the plate and 4¼ in. wide at the discharge edge.

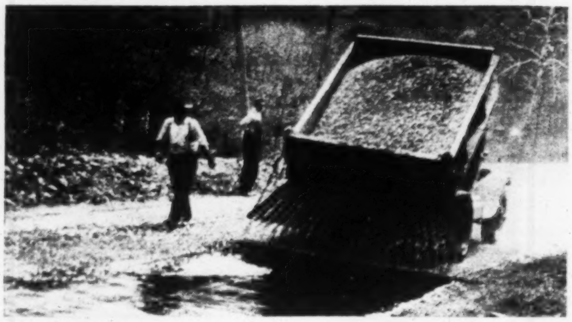


Fig. 2—Truck and spreader in operation

A 2½x2½x$\frac{5}{16}$-in. angle with the horizontal leg flush with the edge of plate was welded to the receiving edge underneath. This edge angle and the plate edge were slotted 2 in. deep at 15½ in. each side of the center, to fit onto and around the web of the body subframe. Two hooks at the edge of the plate fitting into holes drilled in the bottom flanges of the subframe I's held the forward edge of the spreader in position and the flanges supported the load. Another 2½x2½x$\frac{5}{16}$-in. angle welded to the bottom side of the plate 6 in. from the discharge edge added rigidity, and from each end of this angle an adjustable chain running to the top of each tail gate post supported the rear end of the spreader.

The cost of making two of these spreaders was $24.12 for material and $51.56 for labor and equipment use, a total of $74.68, or $37.34 each. This cost could now be reduced, as materials were not then advantageously purchased and the mechanics necessarily lost time in experiment and in fitting the fantails to the truck. The weight of each spreader as built was 280 lb., which also could be lessened by the use of lighter angles or T-bars to form the vanes.

Method of Operation

The fantail was so adjusted that the plane of the plate was approximately parallel to and about 5 in. lower than the plane of the bottom of the truck bed. To prevent the lateral escape of chips from between the sides of the body and the opened tail gate, short 2½x2½-in. angles were welded to the inner face of the gate on each end to form a sliding lap joint as the gate swung outward.

The tail gates were equipped with chains to regulate the required width of opening, which for free flow of dry material was found to be about three times the maximum screen size of the stone being applied. In operation, as the bed was elevated and the tail gate opened, the chips flowed across the plate to discharge in a smooth sheet as the truck backed over the freshly applied oil (Fig. 2). With the truck bed in elevated position the discharge edge of the spreader was about 8 in. vertically above the road surface and the chips in dropping this distance spattered and rolled with just enough uniformity to cover the full 9-ft. width of treatment. There was no ridging of the cover coat as it dropped on the surface.

The quantity of cover per square yard was regulated by the speed of the truck and to a certain extent by the tail gate opening. Capable truck drivers after a small amount of practice learned to govern the truck speed satisfactorily to control the rate of application.

The fleet being used consists of six 3-ton trucks with two fantail spreaders. Six trucks are detailed to the work because their total loads supply sufficient aggregate to cover a full distributor load of oil. As the loaded trucks arrive they are spotted at the roadside at intervals about equal to the distance that a truck load of chips should cover at the desired rate of application. When the distributor starts, No. 1 truck immediately follows, spreading the cover; the dumping foreman rides the truck or trots alongside to keep the driver advised. At the point where the first load of chips runs out No. 2 truck backs onto the oiled surface and proceeds to empty its load. The first truck meanwhile pulls alongside No. 3 truck and two men with the assistance of the driver transfer the fantail while the second truck is proceeding. The detaching and attaching of the light spreader are such simple processes that the transfer can be made in an average time of one minute and has been made in as short a time as 25 seconds.

The process of spreading the loads and transferring the spreaders continues until all the freshly oiled surface is covered, which is accomplished in but little more time than would be required for a single truck to back the distance covered by the distributor load of bituminous material. The treated surface is then immediately opened to traffic, if desired, or dragging, brooming and rolling proceed, with traffic continuing to use the untreated half-width of surface. The cost of the spreaders was so little that a separate fantail might have been provided for each truck, but the described procedure has worked very well, and the two laborers are needed for miscellaneous work while trucks and distributor are returning to stockpile or siding for successive loads.

Output and Cost

From early May to mid-July, 1931, ten weeks, this outfit treated 48.6 miles of macadam, consisting of ten widely scattered projects. About 40 per cent of the time was lost on account of bad weather, moving from job to job, delays in delivery of material, etc., but the spreaders required no repairs and occasioned no delays. A 580-gal. distributor applied 179,478 gal. of various grades of oil. Relatively long haul was necessary in several instances, but where the dead haul exceeded 6 miles, trailer tanks were used to carry the oil from the siding to the distributor at the roadside. The fantails spread 7,827 tons of crushed stone chips on 486,400 sq.yd. of surface (counting double treatment twice) and successfully handled various sizes of chips from maximum grading of 1¼ to ⅝ in. to minimum size of ⅜ in. to 10-mesh at the selected rate of from 15 to 40 lb. per square yard. The unit repeatedly demonstrated its ability to complete in an eight-hour day 2 miles of 18-ft. treatment requiring the spreading of 300 tons of chips at a rate of 30 lb. per square yard. At the end of this period the fantails showed no wear and the outfit proceeded to distribute mineral aggregate for mixed-in-place resurfacing, spreading 1½ to ½ in. crushed stone at a rate of 100 to 160 lb. per square yard, as described. It is conservatively estimated that the use of this simple device reduced the application cost of stone cover by 30c. or more per ton as compared with previous manual methods, besides supplying more uniform distribution and eliminating an appreciable amount of waste.

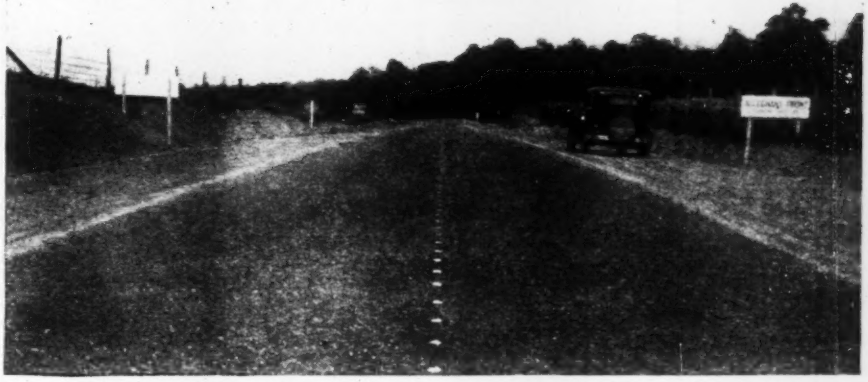


Fig. 3—Finished treatment, showing even cover

* * *

Decline in Wood Preserving in 1930

A decrease of 8 per cent in the total amount of wood treated in 1930 as compared with 1929 is shown by the annual statistical report of R. K. Helphenstine, Jr., for the U. S. Forest Service and the American Wood Preservers Association. The total amount was 332,318,577 cu.ft., 90 per cent of which was treated by pressure processes. There were 204 plants in operation (one more than in 1929), while four new plants were built; 134 used the pressure process, 53 the non-pressure or open tank, and 17 were equipped for both processes. Besides these there were eleven plants idle and one was abandoned. Of eight classes of timber the largest reductions were in cross-ties, poles and wood blocks; only in switch ties was there a slight increase over 1929. Preservatives used included 213,904,421 gal. of creosote (68 per cent domestic), 28,100,316 gal. of petroleum and 13,921,894 lb. of zinc-chloride, with reductions of 5.5, 5.2 and 30 per cent, respectively; in addition there were miscellaneous materials aggregating 1,770,925 lb. of salts and 202,891 gal. of liquids, but both of these classes showed a material increase over 1929.

Light Aluminum for Overhead Traveling Cranes

Since first crane was built 18 months ago, 14 additional cranes of aluminum structural shapes and castings have been placed in service—Experience indicates truss type holds advantages over box-girder design

By R. L. TEMPLIN
Chief Engineer of Tests, Aluminum Company of America, New Kensington, Pa.

FOLLOWING the installation of the first aluminum traveling crane in its Massena, N. Y., shops (*ENR*, Oct. 16, 1930, p. 615), the United States Aluminum Co., subsidiary of the Aluminum Company of America, embarked upon an extensive program of building aluminum cranes for its own use. At the present time the company has fifteen such cranes in service varying in capacity from 10 to 50 tons. In this article Mr. Templin analyzes the development of aluminum overhead traveling cranes from the standpoint of design, manufacture, service characteristics and probable trends. —EDITOR.

IN AN overhead traveling crane the dead load of the crane plays an important part in its design and construction, as well as in the design and construction of the runway upon which it operates. While the advantages of weight reduction have long been apparent, it has only been since the advent of the strong aluminum alloys in commercial shapes and plates that these advantages could be fully appreciated. The light weight aluminum crane, therefore, represents a development of the past eighteen months.

With the dead load of a crane reduced to a minimum, it is apparent that the live load can be increased without any increase in gross load. This often results in economies of sufficient magnitude to offset the higher initial cost of aluminum. For example, it may be necessary to replace a 25-ton crane of the older type with one of greater capacity. By the use of aluminum a 50-ton crane can be used without changing the supporting structure. Again, a reduction in dead weight is a distinct advantage in the case of cranes operating in the bays of buildings with cantilever roofs or in buildings in which the runways must of necessity be extremely long. Energy is required to set mass in motion; by decreasing the mass greater acceleration and deceleration can be obtained so that the lighter crane can be spotted and handled more quickly. The power consumption will also be lower.

While weight reduction is the paramount reason for the use of aluminum in crane construction, the chemical properties of the metal may at times dictate its use. Because aluminum is highly resistant to the corrosive action of certain chemicals, it is logical to assume that aluminized cranes will soon find application in industrial plants in which the fumes are particularly harmful to the older type of crane. Then, too, the fact that aluminum will not rust or scale under ordinary atmospheric conditions makes possible a reduction in maintenance cost. The aluminum crane will not require as frequent repaintings.

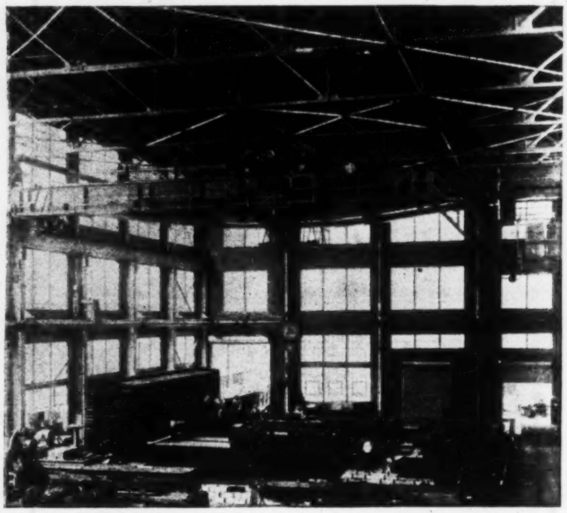


Fig. 1—A 50-ton aluminized crane, the largest yet built
This box-girder-type crane with a span of 81 ft. is 36 per cent lighter than a similar crane of steel construction produced by the same manufacturer.

Pioneer Installation—The first aluminum crane was erected in the structural mill of the Aluminum Company of America at Massena, N. Y., in the fall of 1929. This crane is of the box-girder type, and although not as completely aluminized as subsequent cranes, it weighs 24,000 lb. (26.4 per cent) less than similar 10-ton cranes fabricated from the heavier materials. Briefly described, this crane is a three-motor, single-hook machine with a lift of 22 ft. The bridge, with a span of 72 ft. 2 in., is fabricated from two double-web strong aluminum-alloy girders spaced 7 ft. on centers. Aluminum grating is used in the walkway; the handrails and operator's cage are also fabricated from this metal. The girders frame into cast-steel carriages, while a one-piece cast-steel trolley, carrying the hoisting mechanism, is mounted on the girder rails. On later cranes the castings for the end carriages and trolley are of heat-treated aluminum alloys.

The design of this aluminized crane (*ENR*, Oct. 16, 1930, p. 615) was based largely upon the practice followed in building steel cranes, although certain departures were necessary in the case of the bridge girders, since the modulus of elasticity of aluminum is only about one-third that of steel. Because of this difference it was desirable to construct the girders of the aluminum-alloy crane of relatively deep and wide sections.

The difference between aluminum and steel in dead-load deflection was entirely eliminated by the proper camber. Similarly, the difference in the live-load deflection was offset in the same manner. The following formula, developed by E. C. Hartmann, of the Aluminum Research Laboratories, may be used to determine the proper camber to employ in either a steel or aluminum crane:

$$\text{Camber} = \frac{L^3}{150\,k\,EI}\ (W + T + P)$$

where L = the span length of the crane in inches, W = the total weight of both bridge girders, including walkway, rails, drive shaft and contact angles, in lb.; P = total weight of trolley, in lb.; T = rated capacity of crane, in lb.; E = modulus of elasticity of material in bridge girders, lb. per sq. in. (10,000,000 for aluminum and 29,000,000 for steel); I = moment of inertia of each bridge girder at center line of span (using gross area of entire section including webs).

$k = \dfrac{d_c + 0.4d_e}{1.4d_c}$ in which d_c = depth of girder at center, and d_e = depth of girder at end.

Since this initial venture the Aluminum Company of America has placed in operation fourteen additional three-motor, single-hook aluminum cranes. The first six are of the conventional box-girder type; the remaining nine of the truss type with submerged trolleys. The rated capacities, span lengths and weight-saving characteristics of these cranes are given in Table I.

In the box-girder crane more material is employed than is necessary from the design standpoint. This is done in order to minimize the cost of fabrication, for while less material is required in the truss-type crane, the labor cost is higher. Steel, being a low-priced material, is readily adapted to box-girder construction, but when using aluminum, it is more economical to employ the truss design, since the additional cost of labor is more than offset by the saving in material. Then, too, the main reason for using aluminum is to reduce the dead weight of the structure. The truss-type crane can be designed with approximately the same rigidity as that of the box-girder crane but with a material saving in weight.

The bridge of the truss-type crane (Fig. 2) consists of two Pratt trusses connected in the plane of the top chord by means of a system of lateral bracing. At each panel the assembly is stiffened by a yoke construction. The bridge is made of strong aluminum-alloy channels, angles and plates, connected by bolts, nuts and rivets of the same material. The checker-plate aluminum walkway and the operator's cab of strong alloy are bracketed to the main truss; the drive motor and other machinery parts are fastened to this truss in a similar manner. As a result of the light weight, it was possible to employ a

TABLE I—ALUMINUM CRANES IN SERVICE JULY, 1931

No.	Type	Manufacturer	Capacity, Tons	Span Length	Approximate Total Weight, Lb.	Approximate Total Weight of Box-Girder Type Crane in Steel as Produced by Same Manufacturer, Lb.	Weight Saved by Use of Aluminum Lb.	Per Cent
1	Box	Alliance	10	72′2″	67,000	91,000	24,000	26.4
2	do.	Northern	3	23′ 6″	8,100	21,000	12,900	61.4
3	do.	Alliance	50	81′ 0″	115,000	180,000	65,000	36.1
4	do.	Northern	10	81′ 0″	55,000	86,000	31,000	36.0
5	do.	do.	5	18′ 6″	8,600	21,000	12,400	59.0
6	do.	do.	5	18′ 6″	8,600	21,000	12,400	59.0
7	Truss	Alliance	10-main; 2-auxiliary	72′ 2″	47,710	80,400	32,690	40.7
8	do.	Northern	5	51′10″	20,800	35,000	14,200	40.6
9	do.	do.	5	56′10″	22,800	38,500	15,700	40.8
10	do.	do.	5	56′11″	21,500	38,500	17,000	44.2
11	do.	do.	10	56′10″	25,400	45,500	20,100	44.2
12	do.	do.	10	76′ 0″	29,800	76,000	46,200	60.8
13	do.	Alliance	10	76′ 0″	46,800	79,500	32,700	41.1
14	do.	Northern	10	76′ 6″	30,100	77,500	47,400	61.2
15	do.	Alliance	10	76′ 6″	47,000	80,000	33,000	41.3

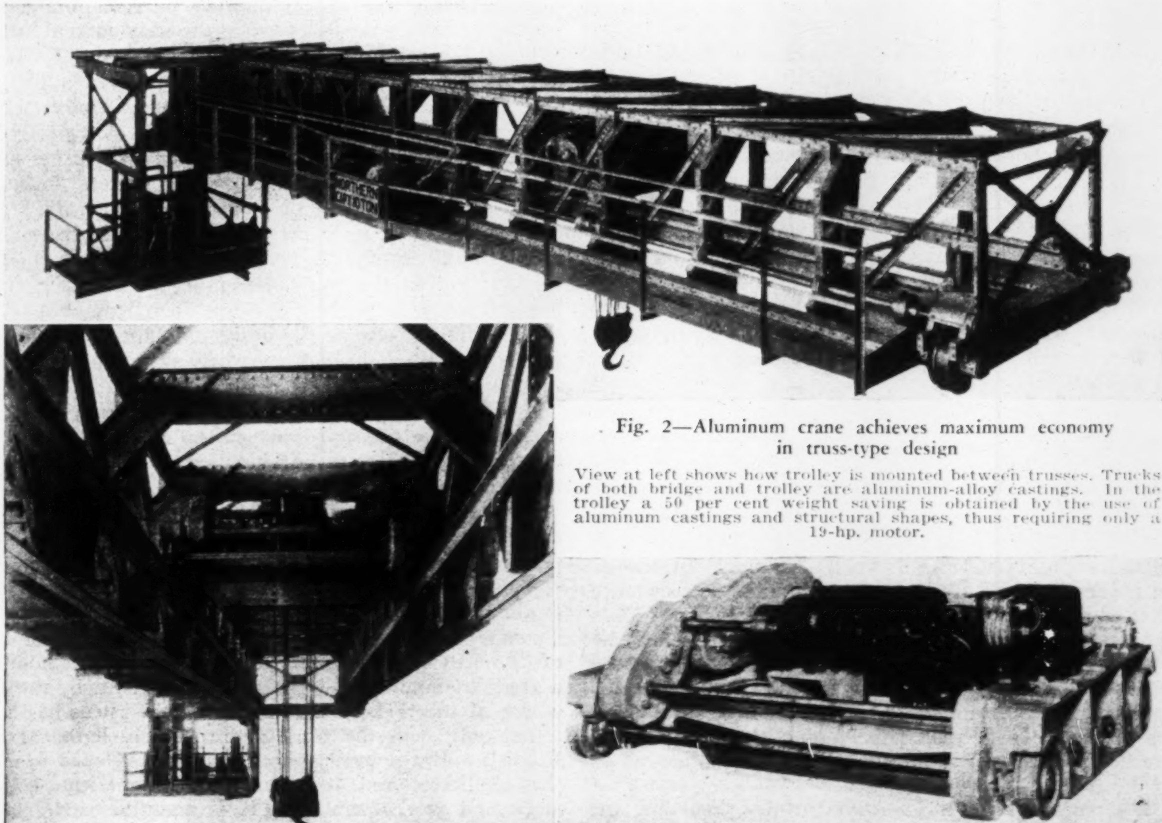


Fig. 2—Aluminum crane achieves maximum economy in truss-type design

View at left shows how trolley is mounted between trusses. Trucks of both bridge and trolley are aluminum-alloy castings. In the trolley a 50 per cent weight saving is obtained by the use of aluminum castings and structural shapes, thus requiring only a 19-hp. motor.

TABLE II—COMPARATIVE WEIGHTS OF 10-TON TRUSS-CRANE PARTS IN ALUMINUM AND STEEL

	Aluminum Crane, Lb.	Steel Crane, Lb.
Weight of trolley, including motors, brakes, etc.	5,500	8,200
Weight of main truss, including rail beam, bracing, walkway, drive motor, etc.	11,400*	28,900
Weight of auxiliary truss, including rail beam, bracing, etc.	6,980†	16,700
Weight of end carriages	2,920	5,200
Weight of operator's cage, including controls, etc.	3,000	5,100
Total weight of crane	29,800	64,100
Total weight of steel crane designed for the same duty with box girders	......	76,000

* Comparable figure on first box-type crane, also of 10-ton capacity' 14,100 lb.

† Comparable figure on box-type crane, 11,900 lb.

19-hp. drive motor on the 10-ton cranes and to obtain the same speed characteristics that are obtained with 45-hp. motors on the ordinary crane of similar capacity.

The trucks carrying the bridge are cast from heat-treated aluminum alloys. All the gear housings, gear covers, bearing housings, transmission cases and covers are aluminum-alloy sand castings. An experimental strong aluminum-alloy tubular shaft is employed on one of the nine truss-type cranes. In all cases the shaft is carried in self-aligning bearing journals spaced at regular intervals along the bridge girder. The bridge is provided throughout with roller bearings and forced lubrication.

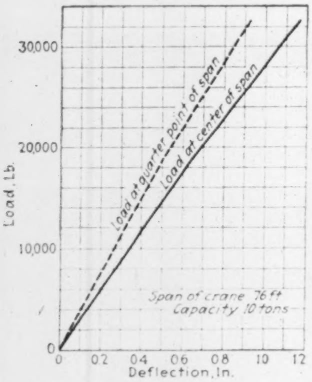


Fig. 3—Load-deflection curve for aluminum truss-type crane

The structural members of the bridge were designed for the full dead load plus the rated capacity load on the trolley plus 50 per cent vertical impact; the lateral loads resulting from starting and stopping were also considered. The members were proportioned so that the stresses caused by the worst loading combinations did not exceed the design stresses given in the "Structural Aluminum Handbook."

The camber for the truss girders was computed in the same manner as for box girders, the same formula being employed, except for the method of determining the value of the moment of inertia, I. In this case

$$I = \frac{(A_1 + A_2)d^2}{2}$$

where A_1 = average gross cross-sectional area of top and bottom chords at center of truss (sq.in.); A_2 = average gross cross-sectional area of top and bottom chords at end of truss (sq.in.); d = depth of truss between working lines (in.).

The submerged trolley is supported between the two trusses and below the lateral bracing on strong alloy rail beams bracketed out from the trusses. In one of the cranes the rails are also of aluminum. The distance between the rail beams and the center line of the truss is held at a minimum in the majority of the cranes by employing a trolley having no outside bearings on the wheels. The eight electric contact rails for the trolley are attached to the under side of the top horizontal member of the yoke at each panel point, thereby giving a simple symmetrical arrangement to the contact shoes on the trolley.

The trucks of the inclosed-type trolley, including the gear and bearing housings, are cast from aluminum alloys. One of the trolleys has heat-treated cast-aluminum-alloy wheels. The trolley is of double-girt construction, both girts being aluminum. The one that carries the hoist motor and holds the sides of the trolley in rigid permanent alignment is fabricated from a heat-treated aluminum-alloy sand casting, while the other, which conveys the live load directly to the trolley sides, is built up of strong aluminum-alloy sections, and is free to adjust itself to varying stresses. The trolley has roller bearings throughout the hoisting and traveling mechanism, and all bearings have forced lubrication.

A weight analysis of the various sections of one of the 10-ton truss-type aluminum-alloy cranes is given in Table II. This particular crane has a span length of 76 ft. and a lift of 25 ft.

Deflection tests made on this and similar truss-type cranes have indicated the practicability of aluminum for crane construction. Two loads were employed in these tests, the first being approximately equal to the rated capacity of the crane and the second 62 per cent overload. In each case the load was suspended at the center of the span and at approximately the quarter point. The deflection readings in both cases were taken at the center of the span and are shown graphically in Fig. 3. No permanent set occurred in the crane after load removal.

While the use of aluminum in crane construction is confined at the present time to the cranes operating in the Aluminum Company of America's own works, the experience that has been gained by the use of the metal in these cranes clearly shows that aluminum has arrived as a material for crane construction.

Magnetic Car-Retarder Brake in England

A magnetic type of car-retarder or track brake for gravity-switching yards, known as the eddy-current brake, has been tried experimentally in England during 1931. It has the usual arrangement of four brake rails (50 ft. long in this case) paralleling the two track rails. Each brake rail rests at intervals on the cores of electromagnets and carries an insulated bar on its inner or wheel side. From the control tower the current is sent to the magnets, energizing their windings and the bars on the brake rails, thus setting up a magnetic flux across the spaces in which the track rails lie. When the system is idle, springs prevent the two brake rails of each pair from being drawn together by the magnetic action. But when a wheel enters between the brake rails, the magnetic circuit is completed through the tire and tends to cause a sudden and great increase of magnetic flux. The rotation of the wheel opposes this tendency, setting up eddy currents in the tire and brake rails. A braking effect is produced by the interaction between these eddy currents and the magnetic flux. This effect is increased by the brake bars sliding forward into contact with the wheels, the gripping effect on the wheels representing 20 to 30 per cent of the total braking force. This force may be applied in three degrees of power, but its application is gradual in any case, no matter how fast the car may be moving. In the English experiments four-wheeled cars of 20 tons total weight, moving at 15½ miles per hour on a grade of 5 per cent, were stopped in 50 ft. by the full power of the brake. This car-retarder system has been tested only with the small and relatively light cars of English railways and has not yet been developed to meet the conditions and requirements of American rolling stock and yard operation. It is manufactured by the Westinghouse Brake & Safety Signal Co., London.

N.E.W.W.A. Reviews Half Century of Waterworks Development

Fiftieth annual convention hears historical papers—Court decisions on interstate waters found favorable to further utilization of such sources — Accelerated public works construction favored over dole for unemployment relief

Engineering News-Record Staff Report

PROMPTED by the occasion of its 50th annual convention, held in Boston, Mass., Sept. 29-Oct. 2, the New England Water Works Association allotted a prominent share in its program to a series of historical papers reviewing developments in the waterworks field during the life of the organization. Contemporary questions were not neglected, however, for other subjects treated included "Emergency Problems of the Waterworks Superintendent," "Tuberculation of Mains and Services," "Relation of Waterworks to Firefighting," water-purification experiences at several New England plants, and a review of recent legal decisions affecting the use of interstate water. These papers were presented by prominent engineers from New England and elsewhere.

Historical Papers

How the chance meeting of two superintendents visiting the waterworks at Lowell, Mass., led to the formation of the N.E.W.W.A. as a medium for the exchange of ideas on waterworks operation was related by Charles W. Sherman, consulting engineer, Boston, Mass. Formal organization was completed at a meeting in Boston on June 21, 1882, the charter list of members including 28 names. Since that time the influence of the association has steadily increased, and it has been responsible for many notable advances in waterworks practice. In concluding, Mr. Sherman gave brief biographical sketches of three members who did notable work in the upbuilding and maintenance of the association: Robert C. P. Coggeshall, Albert S. Glover and Dexter Brackett.

Growth of the Boston water-supply system, from the first conduit installation in 1652 through the development of Jamaica Pond, the Cochituate system, the Chestnut Hill reservoir and successive extensions westward to take in the Sudbury, Nashua, Ware and Swift rivers, was traced by Frank A. McInnes, consulting engineer, Boston. High points of this paper were the step-by-step westward expansion of the system, the superior quality of water obtained and the present flexibility of operation. Since 1895 Boston has been included in the Metropolitan District Water Supply, which now serves more than 136,000,000 gal. per day to twenty municipalities. Although of very good quality, all the supply is chlorinated as an additional safeguard. At present Boston takes 68 per cent of the output of the system. Inasmuch as the Metropolitan District handles all water-supply matters, the jurisdiction of the present Boston water department is limited to distribution. Five service pressure zones are maintained, serving consumers at elevations varying from 16 to 336 ft. above sea level. Also, there is a high-pressure fire service protecting an area of one square mile in the congested section of the city.

Further details respecting the creation and growth of the Metropolitan District Water Supply were given by David A. Heffernan, superintendent of water service, Milton, Mass., who told how the increasing demand for water, threatening to exhaust local supplies, led to the consolidation and mutual development of a single system to serve 20 of the 35 cities and towns situated within a 10-mile radius of the State House at Boston. The cost of this service is divided among the separate municipalities in proportion to their consumption and valuation, consumption having twice the weight of the latter factor. A tabular outline of the finances of towns included in the district was presented. Variations in the characteristics of the different units, their densities of population and other factors cause widely different rates in the various jurisdictions.

The trend of waterworks practice during the past 50 years was reviewed by Caleb M. Saville, manager and chief engineer, water bureau, Metropolitan District of Hartford County, Conn. The many points of this comprehensive subject touched upon in the paper included state regulation, affecting the quality and quantity of supply and the finances of local systems; pumps; dams; purification methods; meters; equipment and supplies, and costs.

Problems of the Superintendent

"Chlorination for Special and Emergency Purposes," by J. D. MacMahon, of the Mathieson Alkali Works, Niagara Falls, N. Y., was the introductory paper in the session devoted to emergency problems of the waterworks superintendent. This dealt with the use of calcium hypochlorite, a chemical said to be more efficient than calcium chloride, that can be applied without increasing hardness and without producing a sludge. Apparatus for application is very simple. The chemical has been used for the control of algæ in reservoirs and aqueducts, for the cleaning of sand filters and in other applications.

In the general discussion that followed this paper the importance of sterilizing new and repaired water mains was stressed by Harry U. Fuller, chief engineer of the Portland (Me.) Water District. Two methods are used in that city, involving the application of either liquid chlorine or chloride of lime. H. W. Griswold, deputy chief engineer of the water bureau, Metropolitan District of Hartford County, Conn., brought out the fact that careful flushing after sterilization should not be overlooked. Hartford uses calcium hypochlorite for sterilizing short lines and liquid chlorine for longer mains.

Continuing the subject of emergency problems, Warren J. Scott, chief engineer of the Connecticut state board of health, stated that the term "emergency" should be applied not only to mechanical failures but also to breakdowns in the quality of water. During normal times, for example, complaints may result from sudden odor and taste troubles caused by the appearance of algæ, the deterioration of standpipe paint or other reasons. Long periods of dry weather frequently result in breakdowns in quality as well as quantity. The superintendent is often hampered by the reluctance of city authorities to make necessary extensions; in such cases it is his duty to know what steps can be taken to supplement the regular supply by connection with another town or the use of near-by lakes, ponds or industrial supplies. Usually such steps require treatment of the emergency supply, for which suitable equipment should be on hand or readily obtainable. Other emergencies to be guarded against include the breakdown of filter beds, requiring a bypass and chlorination apparatus, and the absence or illness of the regular operating personnel.

Theodore L. Bristol, president of the Ansonia (Conn.) Water Co., listed five precautions that should be taken by every waterworks superintendent: (1) Buy good pipe and lay it well. (2) Keep gate valves in good condition and operate every one at least once a year. (3) Keep a card index showing the location of all gate valves. (4) Provide all superintendents and foremen with telephones so that they can be reached promptly. (5) List all industrial plants dependent upon city water for boiler feed so that these can be notified in times of shortage.

A number of experiences from actual practice were related by various speakers. At Winthrop, Mass., a main extending along the seashore is carried through the back yards of houses rather than in the street, to avoid damage during storms. George F. Merrill, Ware, Mass., related an instance of the breaking of two independent supply mains 15 ft. apart by the same bolt of lightning. St. John, New Brunswick, has every service valved and marked, four gates at every intersection and an automatic pressure alarm to call attention to breaks, according to R. W. Wigmore, commissioner of water and sewerage. H. W. Griswold, Hartford, stated that two men should form the minimum emergency crew, as one may be absent attending to a small difficulty when an emergency arises. H. T. Gidley, superintendent, Fairhaven (Mass.) Water Co., stated that most systems do not have enough gate valves. S. H. MacKenzie, engineer and superintendent, Southington water department and Terryville Water Co., Southington, Conn., advocated duplicate main supply lines, auxiliary well supplies when possible, ample blowoffs to aid in cleaning mains, flanged gates for every hydrant placed far enough away to permit operation after a break, plenty of gate valves, and the installation of service pipes in a straight line from house to main.

Tuberculation of Pipes

The theory that tuberculation on the interior of water pipes is the result of bacterial action and is a process similar to the formation of bog ore or limonite was advanced by S. E. Linderman, of the United States Pipe & Foundry Co., Burlington, N. J. Careful examination of tubercles and of ore have revealed the presence of the same type of higher bacteria in each. To prevent pipe tuberculation, two steps should be taken: The pipe should be lined in such a way as to afford no opportunity for the collection of bacteria on small particles of concentrated iron, and the water should be kept in a slightly alkaline condition to inhibit the growth of the bacteria. Experiments show that water carrying iron in solution will cause tuberculation if of slightly acid reaction, but not if slightly alkaline. Instances were cited where a slight change in the pH content of water greatly reduced trouble due to tuberculation. A pH value between 6 and 7 is most desirable.

Discussion of this paper brought out a number of comments. Malcolm Pirnie, consulting engineer, New York, told of a 12-mile pipe line at Utica, N. Y., which for a short period removed iron from the water which it carried at the rate of 9 tons per year. By shifting the point of intake, it was possible to procure water with a lower iron content and decrease this action. D. A. Heffernan, Milton, warned of the danger of clogging when using small unlined pipe, and recommended that either larger sizes should be used or the pipe should be lined. Roger W. Esty, superintendent of the Danvers (Mass.) waterworks, said that after being placed in service a cement lining losses its gloss but is otherwise unchanged. It sometimes picks up a brown slime which, when dry, can readily be brushed off with the hand. Charles W. Sherman, Boston, told of a cement-lined 17-in. wrought-iron riveted pipe in service since 1877 which, when recently removed, was in very good condition. The interior surface resembled coarse sandpaper and could be scored with a steel tool, but was still intact.

Comment on various materials for service pipe was contradictory. Reason for and against the use of galvanized, lead, copper and brass services were advanced. The conclusion reached was that no one type was best fitted for all conditions, and that the proper selection of material should be a function of the water department, with the advice of a chemist, rather than of the individual owner or plumber.

Use of Water in Fighting Fire

The fact that the water consumption rate may reach an extremely high peak during large fires or conflagrations was stressed by C. W. Mowry, manager of the inspection department, Associated Factories Mutual Fire Insurance Companies, who proved his contention by reference to a number of major fires during the past few years. The universal use of automobile fire apparatus, making it possible to concentrate a large number of engines in a short time, tends to increase the amount of water used. Although it is rare for the total amount of water used in firefighting to exceed 1 per cent of the annual consumption, it is not unusual for short-time demands to exceed the capacity of the waterworks system.

The fact that adequate charges are seldom imposed for fire protection was brought out by J. Walter Ackerman, city manager of Fall River, Mass. Even though the amount of water used may be negligible, the necessity for stand-by equipment in order to meet a possible heavy draft is expensive and should be charged to the consumer who benefits, not distributed over the entire city. Expressing a different point of view, Caleb M. Saville, Hartford, advanced the argument that as industrial plants are an asset to a town, the taxpayer should logically assume at least a part of the burden of fire protection for such plants. Mr. Mowry pointed out that plants without sprinkler installations may demand standby capacity for fire protection to the same extent as do those so equipped.

Painting of fire hydrants to indicate the number of pumping engines which each can supply, in accordance with a definite color code, was advocated by James W. Graham, general manager of the Portland (Me.) water district. This system is now used in Portland and other cities in Maine. It was commended by Charles W. Sherman, Boston, who suggested that the association appoint a committee for the purpose of developing such a code and extending its application throughout New England. This suggestion was received with approval and referred to the governing authorities of the association.

As a preliminary to the scheduled demonstration of the high-pressure fire system in downtown Boston, details of the installation were described by Mr. Williamson, superintendent of maintenance of the Boston fire department. One of the important points brought out was that the fire department reports to the water department the number of hydrants used at every fire, so that the latter can make prompt inspection of these hydrants.

Immediately after this session the delegates attended the demonstration where fifteen nozzles of from 1½ to 2 in. diameter discharged a maximum of 35,000 gal. per minute from the high-pressure fire system and two fireboats. Starting with an initial pressure of 150 lb. per sq.in., the pumps were successively stepped up to pressures of 175, 200 and 225 lb. per sq.in.

Water Purification

Carrying on the idea of historical review, Robert Spurr Weston, consulting engineer, Boston, presented a paper, "The Beginnings of Water Purification," in which he traced the growth, both in this country and abroad, of the various means of water treatment, including slow and rapid sand filtration and chlorination. Early improvements, according to Mr. Weston, were mostly connected with structural design of plants; more lately methods of treatment have received the attention of the engineer. In closing, it was pointed out that present high standards for domestic water supplies point to the need of even more study in attempts to increase the effectiveness and decrease the cost of proper treatment.

Detailed operating data and experience in filtration plants at Cambridge, Mass., Providence, R. I., Hartford, Conn., and Greenwich, Conn., were presented by Melville C. Whipple, assistant professor of sanitary chemistry, Harvard Engineering School, and supervising chemist, Cambridge waterworks; E. L. Bean, chemist, Providence (R. I.) waterworks; W. A. Gentner, office engineer, water bureau, Hartford, Conn.; and H. C. Chandler, chemist, Greenwich (Conn.) Water Co. This set of papers analyzed in detail operating methods and difficulties, the means taken to overcome these and, in most cases, the cost of operation. At Cambridge an attempt to return wash water to the system is about to be abandoned because of operating difficulties introduced. Providence recently modified its process of treatment because of an increase in the manganese content of the raw water. The Hartford waterworks operates its own hydro-electric plant, using water from an abandoned storage reservoir to generate all power for filter plant operation. Greenwich is working both a new and an old filter plant in combination, and contemplates further extension in the near future.

Interstate Water Rights

An entire afternoon devoted to the general subject "The Allocation of Interstate Waters for Water-Supply Purposes" proved insufficient for the presentation of all the discussion evoked by two papers dealing, respectively, with the Delaware and Connecticut river diversion projects, which were presented by Thaddeus Merriman, chief engineer, board of water supply, New York City, and Frank E. Winsor, chief engineer, Metropolitan District Water Supply Commission, Boston. Both papers were based upon recent supreme court decisions which have been abstracted in *Engineering News-Record*. Mr. Merriman outlined the principles of the riparian doctrine, which dates back to the common law of England; of prior appropriation, adopted by many of the Western states; and of equitable apportionment, given sanction by the U. S. Supreme Court for the first time in the Delaware River decision. He pointed out that the court had built up what might be termed a code of interstate common law based upon five main principles: (1) To justify court action, the injury suffered must be substantial rather than technical. (2) No state has the right to divert the water of its streams to such an extent as to injure another state. (3) Equitable apportionment does not necessarily imply equal rights or equal division. (4) Diversion of water to another watershed cannot be arbitrarily forbidden. (5) A court will not rule in respect to future conditions or rights, but must limit its findings to present circumstances.

Mr. Winsor narrated the step-by-step development and westward expansion of the metropolitan water-supply system, showed the necessity for resorting to the Ware and Swift rivers (tributaries of the Connecticut) and told of the legal steps necessary to assure the right of Massachusetts to divert waters from these streams.

Discussion of the two papers was devoted chiefly to clarifying points at issue in the two cases before the supreme court. Among the speakers were H. P. Eddy and H. K. Barrows, Boston; James F. Sanborn, New York City; H. T. Critchlow, division engineer, and Morris Sherrard, consulting engineer, New Jersey State Water Policy Commission; Ezra Whitman, Baltimore; Nathan T. Jacobs, Pittsburgh; and X. H. Goodnough, Boston. Mr. Goodnough closed the discussion with the pertinent remark that the rapid growth of urban population makes the use of interstate streams of increasing importance. Either some plan must be evolved permitting their diversion and use, or our cities must be contented with greatly inferior water supplies purified at high cost. The latter is intolerable.

Business Transacted

Perhaps the most outstanding step taken at the meeting was the adoption of a resolution advocating the advancement of state funds to revenue-producing utilities for the immediate expansion and improvement of facilities in order to provide employment during the coming winter. The money so provided would be used to pay interest upon bond issues over a three-year period, thus providing for a large volume of work with a given expenditure. At the end of three years the utilities would be required to assume interest payments; later it is assumed that the burden of amortization would also be taken up.

Other actions taken included the amendment of the constitution to simplify election procedure; the creation of a committee to study fixtures and appliances used on water services; and the election of Charles W. Sherman, consulting engineer, Boston, to honorary membership. The Dexter Brackett memorial medal for the most meritorious paper presented before the association was awarded to Frank C. Hale, director of laboratories, department of water supply, gas and electricity, New York City, for a paper "Control of Microscopic Organisms in Public Water Supplies, With Particular Reference to New York City." George W. Brehm, Waltham, Mass., was elected president and E. Sherman Chase, Boston, vice-president.

A.G.C. Offers Construction Plan

Specific recommendations presented, headed by unemployment relief —Affiliate with U. S. Construction League—Hosts to British builders

Engineering News-Record Staff Report

CALLING for special sessions of Congress and state legislatures if necessary to put the plan into effect, the Associated General Contractors at its fall board meeting held in Washington Sept. 30 and Oct. 1 came forward with a definite construction policy for business revival, headed by recommendations for unemployment relief. Sounder construction financing, federal aid for schools, hospitals and eleemosynary institutions, and an analysis of value received for taxes paid are other important recommendations contained in the plan.

A.G.C. CONSTRUCTION PROGRAM

1. **Relieve unemployment by doubling present amount of public works construction.**
2. **Push special assessment work by loans from revolving funds provided by bond issues.**
3. **Urge all citizens and institutions to undertake construction at present low prices.**
4. **Increase credit through a federal reserve board.**
5. **Abolish prison labor competing with free labor.**
6. **Stabilize the prices of construction securities by examining their values and controlling the management of construction projects.**
7. **Study value received for taxes.**
8. **Extend federal aid to county roads, schools, hospitals and eleemosynary institutions.**
9. **Build state buildings on bonds.**
10. **Require public utilities to set up expansion reserves.**
11. **Certified construction to be the basis of larger realty loans.**
12. **License contractors and establish credit bureaus.**

Urge special sessions of Congress and state legislatures if necessary to put these recommendations into effect.

The two-day session was crowded with important business. Affiliation with the newly formed Construction League of the United States, made up of national associations connected with construction, was approved. Unemployment insurance was discussed and referred to the cabinet for further study. Legislative programs were mapped out, including plans for amending the federal Bacon-Davis act. Thirty-five members of the British Institute of Builders, on a tour of this country, were guests at final sessions and the banquet held Oct. 1.

A sincere desire for closer cooperation with other elements of the construction industry was noticeable throughout the sessions. A single-price system of bidding came in for much discussion. Both general contractors and subcontractors were blamed for the disrupting practice of shopping for bids. Revision of insurance rates was urged, including the possibility of determining compensation insurance premiums from total hours worked rather than from the present practice of using payrolls as a basis.

Cabinet Reports

The president's cabinet, the governing board of the association, reported on four meetings held since the annual convention last January. A total of 29 topics had been discussed and acted upon in these four meetings. One of these was the establishment of a code of ethics and schedule of fees for consulting constructors. Construction stabilization was another topic reported on, with the announcement that aid of the U. S. Chamber of Commerce would be sought in this respect. The cabinet also urged the establishment of single structural insurance policies for contractors, in order that all points may be covered, citing the failure of Pennsylvania to carry insurance on a state building during construction, resulting in disasters to the contractor involved. Many of the cabinet's recommendations were incorporated into the general construction plan.

Reports of Managing Director Harding and the treasurer indicated that despite the fact that last year's income had been reduced by 40 per cent, economies effected by the Washington staff will probably carry the organization through the year without a deficit.

Closer contact among secretaries of branch chapters will be maintained through zone meetings of the secretaries, attended by staff or cabinet officials. The secretaries held a one-day meeting of their own before the general sessions, and the plan was so successful that it will be continued for all future board meetings.

Committee Reports

Nearly every one of the 30 or more standing and special committees submitted reports showing progress during the past season. The highway contract committee reported some progress in establishing road maintenance by contract. Building of secondary roads by contract is being given serious consideration in the face of tendencies of state highway departments to purchase extensive equipment and do the work by day labor. The building codes and permits committee will cooperate with other interests in establishing uniform building codes. It was pointed out that the cost of building construction would be lessened by such action.

Three amendments to the Bacon-Davis law will be brought before Congress. These include the ascertaining and publishing, at the time bids are called for, of prevailing rates to be paid. In the event of a change of rates during the course of the contract, the difference in cost would revert to the proper party, the government in case rates went down, the contractor in case rates were raised. The third amendment to the bill calls for the government to pay pravailing rates on work done by its own forces.

In view of the successful standardization of mixers and pumps, the association has offered the services of its cooperative construction bureau to the manufacturers of almost every other line of equipment with the hope of effecting further standardization. The board also indorsed means of closer cooperation with the Bureau of Contract Information, urging contractors to support the work of the bureau by refusing to buy bonds from surety companies writing bonds where irresponsibility is definitely known.

Outside speakers addressing the meeting included Major-Gen. Lytle Brown, chief, Corps of Engineers, D. W. Springer, executive secretary, American Society of Certified Public Accountants; M. J. Gormley, executive vice-president, American Railway Association; Silas H. Strawn, president, U. S. Chamber of Commerce; Arthur R. Costain, past-president, British Institute of Builders; Sir Stephen Easten, London, and Dr. Isador Ludin, economist, Washington.

W. A. Starrett, of Starrett Bros. & Eken, New York, was nominated for president of the association for next year. Henry J. Kaiser, San Francisco, was nominated for vice-president at large. Election of officers will be held at the annual convention in Milwaukee, Jan. 18, 1932.

Unemployment Relief Occupies State Highway Officials at Salt Lake City

Providing jobs considered more important that mere speed in completing projects — Resolutions urge continuance of Federal appropriations for highway work at present rate

Engineering News-Record Staff Report

UNEMPLOYMENT relief through the medium of highway work and consideration of the Pennsylvania and North Carolina programs for wholesale additions to their state highway systems provided major topics at the seventeenth annual convention of the American Association of State Highway Officials held in Salt Lake City Sept. 28-Oct. 1. The meeting had an attendance of 360 registering from all but four states, in addition to a large group from the U. S. Bureau of Public Roads organization. Addresses of interest to the general assembly were followed by the usual group and committee meetings. F. E. Everett, commissioner of highways, New Hampshire, was elected president of the association for the coming year, and Washington, D. C., was selected as the place for the 1932 convention.

Resolutions adopted at the final session advocated: (1) maintaining the federal highway appropriation for the 1934-35 biennium at the present annual figure of $125,000,000; (2) removal of the limit for federal participation per mile of highway, since it prevents proper recognition of the varying cost of individual projects, and authorizing aid up to 50 per cent of the cost; (3) continued designation of main routes by official number rather than by name as fostered by certain local interests; (4) renewal of the $3,000,000 fund for road extensions across the public domain until the purpose of this appropriation has been accomplished; (5) maintaining the next appropriation for roads in national forests at not less than the present figure.

The annual report of W. C. Markham, executive secretary, presented figures on mileage added to the combined state systems, as reported in our news pages last week, and statistics on finances. The total income for state highway activity during the past year was $1,136,673,000—the largest on record—and was derived as follows: 25.9 per cent from license fees, 36.0 per cent from gasoline tax, 19.5 per cent from bonds, 5.3 per cent from local authorities, 0.9 per cent from state tax levy, 2.8 per cent from direct appropriations, 1.6 per cent from miscellaneous and 8.0 per cent from federal funds. Bond issues were made in eighteen states last year, Tennessee leading with $36,630,000.

Expenditures during the year amounted to $979,997,000, an increase of $180,000,000 over those of 1929. These payments were divided as follows: 62.5 per cent for construction, 16.8 per cent for maintenance, 4.4 per cent for interest on bonds, 6.1 per cent for retirement of bonds, 5.8 per cent transferred to local roads and 4.3 per cent for equipment and miscellaneous.

An address by D. B. Steinman on "Fifty Years of Progress in Bridge Engineering" traced the advance of the art since the building of Brooklyn Bridge, naming the record-breaking structures of various types and pointing out the growing tendency toward a consideration of esthetic factors.

Pennsylvania and North Carolina Programs

Samuel Eckels, chief engineer, department of highways, Pennsylvania, discussed the recent addition of 20,000 miles of township roads into the Pennsylvania highway system. Developing some of the theory behind the extension of any state system to include local roads, he described the chaotic condition of township road organization in his state with its disregard for systematic development and maintenance. He outlined the original opposition of township commissioners to suggestions of state control and the subsequent campaign of education by organizers from the department. The effort terminated in the recent legislative act adding the 20,000 miles of local roads to the control of the state department. It was significant that the recommendation of the department as to mileage was unchanged by the legislature except in a very minor way. He concluded with the statement that the Pennsylvania case should be of interest to other states, for it represented the inevitable development in highway practice.

A somewhat similar subject was discussed by Charles H. Ross, attorney for the North Carolina state highway commission, whose topic was "North Carolina's Adventure in the Field of County Roads." Taking over 45,000 miles of local roads in that state by the highway commission he characterized as a pioneer step. As a result of the new law in that state, all road construction and maintenance is centralized in the state commission and it becomes unlawful for local government units to levy taxes for road purposes.

The excessive burden of property taxes was a large factor in bringing about this development. However, the inherent reluctance of the public to relinquish any local authority of government, particularly in a section of the country where traditions of local government are so strong, makes the procedure all the more significant. It was pointed out that this step did not indicate any plan to extend the state system to this mileage and a definite distinction will be maintained. One of the interesting side issues of this program was the simultaneous placing of all county prisoners in charge of the commission to be used on road work. These 4,000 prisoners are used in floating gangs of about twenty to assist the regular maintenance force.

Although the new program has been in operation for only three months and adequate conclusions are as yet impossible, it is considered to be working successfully by those acquainted with the magnitude of the problem and its mass of detail. Among the benefits accomplished or expected of the plan are: (1) lifting an $8,500,000 burden of property tax and eliminating further local bond issues for road work; (2) unifying control over gas tax and license money; (3) provision for competent engineering supervision for local road planning and improvement; (4) removal of the disrupting influence of local politics from local roads; (5) extension of the budget form of revenue control, and economic and continuous use of heavy equipment.

In closing, Mr. Ross suggested that the time had come when state highway departments should turn their attention from main traffic arteries and consider local road problems. He reiterated Mr. Eckels' thought that other state commissions could well afford to take cognizance of these developments in local road control, for they may expect the same general problem to be laid on their doorsteps in the future.

Bureau of Public Roads Program

In the succeeding address, T. H. MacDonald, chief of the U. S. Bureau of Public Roads, opened with a few comments relative to the preceding subject. It was his opinion that any general acceptance of the North Carolina plan for the wholesale dumping of mileage on state highway commissions without adequate plans for corresponding increase in revenue is open to question. Although conditions in a particular state may make the procedure advisable, the adoption of a general program of this nature could be visioned as resulting in placing state highway commissions in the same predicament now common to local units of road control.

Turning to a survey of present conditions in highway activity, he voiced the opinion that the possibility of large-scale unemployment relief through highway work has been grossly overemphasized and added that huge programs of public work cannot be suddenly turned on and off as has been suggested. In cases of minor depressions or acute local conditions, the acceleration of public work might be made an effective measure of relief, but the present situation is so far reaching and fundamental that artificial stimulation of public work can bring only a small measure of relief. However, this does not imply any reluctance on the part of the bureau to assist in making as many jobs as possible out of present highway work, and it will consider placing men at work more important than mere completion of the projects in the present emergency.

Figures indicate that the lower unit costs now being realized on highway construction have not resulted in a material reduction of the wage scale for common labor. There were 380,000 men employed on highway work (not including local road or city work) last July, and it is a reasonable estimate that at least twice that number in addition were given work indirectly as a result of the activity. There must be reason applied in the attempts to create more jobs, for such procedure is an attempt to solve an economic problem by an uneconomical expedient and the wholesale providing of pick and shovel jobs is not a panacea for unemployment.

The bureau stands ready to give wholehearted cooperation to sincere efforts of state commissions for relief measures. Important emergency provisions that the bureau will agree to are: (1) fixing a common labor wage if it is established as a fair wage under present conditions and is inserted in the call for bids; (2) specifying a preference for local labor; (3) participation in small projects by force account where conditions are extreme (and legal according to state law), provided that this work shall be considered as an emergency measure only and in no way a departure from the contract system; (4) agreement with plans to allow intermittent or rotating employment to provide part-time work for more men, although such procedure is better suited to smaller local projects not under federal aid. In this connection Mr. MacDonald stressed two other proposals that would receive no consideration from the bureau regardless of local conditions. They are attempts to bar the low bidder on a job because he is from outside the state and any restriction that confines the buying of materials to firms within the state.

A talk, which had not been scheduled, by Representative D. B. Colton, Utah, one of the authors of the Colton-Oddie road measures, stressed the need for emphasizing unemployment relief in all highway programs at this time. He predicted that demands for the dole would be placed before Congress in December and that pressure to restrict appropriations would be severe. The most forceful argument which in his opinion could be presented for securing a continuing or increased highway appropriation will be proof that this money is a direct benefit to employment. Scattered reports from rural districts which indicate that highway money is not affording the relief expected will have a serious effect on Congressional attitude toward highway funds.

The need for greater uniformity in road signs and traffic codes was pointed out in an address by E. W. James, chief, division of highway transport, Bureau of Public Roads. The code worked out and adopted several years ago by the association is in general use on most rural roads, but the code of the national council on street and highway safety is followed by most municipalities. The association code was evolved without ample time for detailed study, and improvements could now be made as a result of experience. Further, the code does not include reflecting or signaling devices and needs revising to cover these later developments. He urged that efforts be made to combine the code with that of the National Safety Council, including proper amplification, so that a single complete code may be available that will provide a system of traffic control for rural, suburban and urban traffic. The growing recognition of safety as a part of highway operation lends support to adequate study of provisions for traffic control.

In the closing address before the general session W. E. Ryberg, Salt Lake City contractor, urged extension of the contract system to include maintenance work, a field of highway activity now usually handled by force account. His argument was based entirely on the point of public economy and did not reflect on administrative procedure for types of work distinctly in the day-labor class such as small patching jobs, ditch cleaning and snow removal. However, the experience of some states indicates that many operations now commonly done by force account can be successfully and economically let by contract. He quoted highway officials to show that the advisability of doing work by contract, in general, was unquestioned.

LETTERS TO THE EDITOR

Registration and Professional Self-Interest

Sir—May I be permitted to congratulate you upon your editorial on the subject of professional solidarity and saparate licenses as it appeared in your issue of Sept. 3. I believe that this is the first time that a writer on the licensing acts has put the emphasis where it should be—emphatically and definitely on public protection—and as emphatically and definitely minimized the narrow ground of the profession's self-interest.

Your expressions, "It is regrettable that the highest representatives of the civil engineering profession should stand on the narrow ground of self-interest and ignore the paramount considerations of public interest . . ." and "The civil engineers' board does not recognize and express its public obligations but argues narrowly—and mistakenly—for professional self-interest. Mistakenly, because the profession will always find its best interests in that which will enable it to serve the public best" ring out with sincerity and truth. They constitute a statesmanlike utterance of the highest nature, and engineers throughout the continent would do well to realize them word for word and the deep meanings underlying them.

It should be manifest to the most immature student of legislation and registration acts that lack of success is bound to meet any body of men that approaches legislatures demanding registration acts, if their demands are based on mere self-interest. This is undoubtedly why so many acts have been disallowed or vetoed. In spite of a few engineers who emphasize the public's interest, too many engineers have with naïve sincerity let it be known far and wide that their sole motive in seeking an act was that of self-interest. Paradox as it may seem, the engineering profession will only be protected by legislative enactments when the legislators are convinced that the engineering profession seeks registration acts in a truer and more worthwhile spirit—the public's interest rather than its own.

I would not suggest the adoption by engineers of any Machiavellian tactics, but even such tactics would indicate not a higher, but a more advanced, standard of education and a deeper knowledge of life than the ingenuousness or naïvety with which engineers so often seek registration acts. On the contrary, I would advance that registration acts should be sought only in a spirit of deep sincerity, even the sincerity of humiliation, based on the consciousness that so many men calling themselves engineers, doing engineering work and recognized as such by the voluntary societies are but partly educated either in an engineering sense or in a general cultural sense.

If the legislatures had been approached in a sincere community spirit, not only would registration acts have been granted by all legislatures, but they would have been sponsored by all and not a few of the voluntary engineering societies. As for self-interest, that would have come later incidentally. When our senior engineers and our voluntary societies cease to be solely interested in their individual engineering work and, for the societies, when they cease to be satisfied with the success in a prescribed way of their own society and take an interest in the whole profession; when the senior engineers and the societies recognize and change their present deadness of interest to all other community affairs, even that of engineering education, when the profession by means of registration acts and other connoted activities has raised the individual standard of every person calling himself an engineer and doing engineering work—then, as a due reward, the profession will receive greater recognition, higher social status and greater monetary remuneration.

Today we are trying to *command* success by registration acts. We should rather be aiming to *deserve* success by these acts.

> "Tis not in mortals to command success,
> But we'll do more, Sempronius, we'll deserve it."

E. A. Wheatley,
Registrar, The Engineering Profession
in British Columbia.

Vancouver, B. C.,
Sept. 17, 1931.

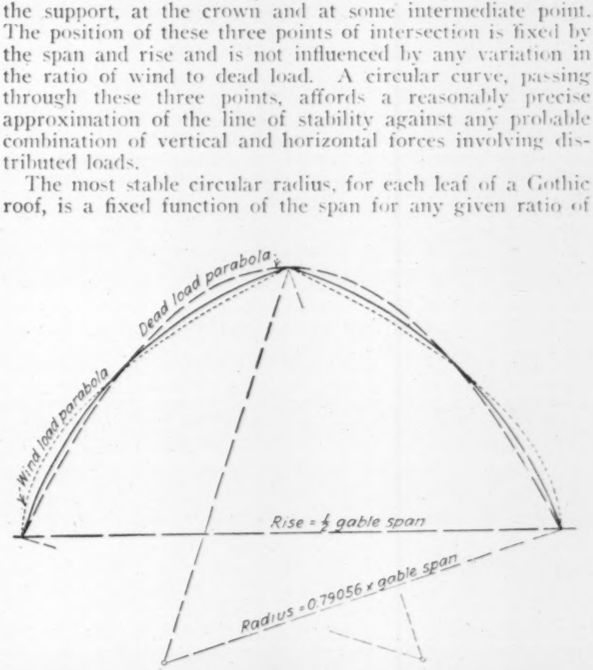
Pointed-Arch Roofs

Sir—In the present-day revival of interest in wood construction, the merits of the laminated-wood, Gothic-arch roof seem to be worthy of special attention. The writer has recently been interested in this type of construction and in reviewing the principles underlying its stability.

Assuming a vertical dead load that is uniformly distributed over the span, a parabolic curve with its axis vertical represents the most stable position for the resisting arch. Assuming a horizontal wind load uniformly distributed over the rise, a parabolic curve with its axis horizontal represents the most stable position for the resisting arch. Under a combined wind and dead load the most stable resisting arch must have a locus which falls between these two parabolic curves, as illustrated in the accompanying sketch.

Considering a single leaf of the gable, the dead load parabola and the wind load parabola will always intersect at the support, at the crown and at some intermediate point. The position of these three points of intersection is fixed by the span and rise and is not influenced by any variation in the ratio of wind to dead load. A circular curve, passing through these three points, affords a reasonably precise approximation of the line of stability against any probable combination of vertical and horizontal forces involving distributed loads.

The most stable circular radius, for each leaf of a Gothic roof, is a fixed function of the span for any given ratio of



Circular curve passing through three points of intersection of dead and wind load parabolas outlines a stable form of a pointed arch rise to span. Computations, which still lack the check of a large-scale layout, suggest that the most stable radii for several ratios of rise to span are as follows:

0.75248 × span, for ¼ rise to span ratio.
0.79056 × span, for ½ rise to span ratio.
1.07551 × span, for ¾ rise to span ratio.

As the pitch of the roof is increased, it will be found that the circular curve passing through the three points of parabola intersection falls closer to the wind load parabola; and as the pitch is decreased this same circular curve more nearly approaches the dead load parabola. Inasmuch as wind loads increase with an increase in the roof pitch, this characteristic of the construction appears to possess merit.

It may possibly be true that these or similar relationships are already recognized and in use in practical construction, but in view of the opportunities for economy and stability offered by the Gothic roof, a consideration of the subject from the standpoint of first principles seems to be justified at this time. S. L. MOYER.

Montevideo, Minn.,
Sept. 10, 1931.

Ford Water Tunnel, Detroit

Sir—The article in your issue of Aug. 6, 1931, entitled "Concrete Block Lining Permits Rapid Driving of Large Water Tunnel in Detroit," is an admirable description of that work. The illustrations give an excellent idea of the plans and methods of construction of the tunnel. However, its capacity is understated, the needlessness of the 18-in. monolithic concrete inner lining of the 18-ft. concrete block tunnel is not explained, and there are some additional facts in connection with the work that should be made known. As I furnished all the plans, shop drawings of block molds, erection apparatus and much information regarding the little-known art of constructing concrete block tunnels, as well as certain patent rights, I feel well qualified to discuss this project. These additional and supplementary facts concern both the capacity and strength of the tunnel.

First, as to capacity: It is obvious that the capacity of a 15-ft. tunnel 12,400 ft. long between inlet and pump well varies with the head. The 913.6 million gallons daily given as its capacity is, in reality, its capacity for a head of 15 ft. Careful computations show that the capacities of 20-ft., 30-ft. and 40-ft. heads would be, respectively, 1,244, 1,520 and 1,762 m.g.d. The capacities for like heads, with the 12,000 ft. of 18-ft. concrete block tunnel, unlined, and 200 ft. of 15-ft. tunnel at each end (designed and built with the intake and pump well structures), would be, respectively, 1,866, 2,300 and 2,657 m.g.d., an increase of 50 per cent. The most favorable industrial sites are along the 6,000 ft. of tunnel nearest the inlet. If this section had been left 18 ft. in diameter (without inner lining), with the other portions 15 ft. in diameter, the compound tunnel would deliver at the pump well, for like heads, 1,452, 1,782 and 2,054 m.g.d., respectively. Then if manholes had been constructed along the unlined 6,000 ft., to tap the tunnel for water supply for other industrial plants, the capacity of the compound tunnel would be further increased.

Computations show that the quantities available at the manholes, plus the capacities of a 15-ft. tunnel at the pump well, which would not be interfered with, for 20-ft., 30-ft. and 40-ft. heads, would be 2,275, 2,780 and 3,208 m.g.d. for the respective heads. Deducting from these the 1,244, 1,529 and 1,769 m.g.d. capacities of the 15-ft. tunnel, as built, at the pump well, there would be left 1,030, 1,251 and 1,439 m.g.d. as the amounts of water available at the manholes for 20-, 30- and 40-ft. heads.

The Ford Motor Co. has made clear that a 15-ft. tunnel gives it all the water it requires. It follows then that had the 6,000 ft. of 18-ft. tunnel nearest the inlet been left unlined more than a billion gallons of water daily would be available for other parties from manholes along the tunnel. Thus a great water supply for future industrial plants, from an inexhaustible source, is wasted by the 18-in. inner monolithic lining. This lining cannot take any of the stresses of the concrete block tunnel, since that tunnel had taken its full load and final shape with a factor of safety of ten before the inner lining was installed.

That the inner lining was not needed to supply additional strength to the block lining is evident from the following: In sinking the two shafts, the ground for 35 ft. below the surface was found to be a stiff clay; below this level being a plastic clay for the remainder of the depth. This thick layer of stiff clay, above the plastic clay through which the tunnel was driven, accounts for the resistance to lifting of the 3 tons per square foot cover above spring line, resulting from an 8-ton per square foot pressure of shield and bulkheads against the plastic heading. As pointed out in the article, the pressure exerted by the bulkheads was transmitted in all directions during shoves, similar to hydraulic pressure. This stiff, thick cover also distributed surface loads, such as buildings or railway trains, long before reaching tunnel level, so the computed stresses in the tunnel lining are never exceeded from such sources. These facts were known to me when the concrete block lining was designed with such an ample margin of strength, and the probability that an 18-in. inner concrete lining might be used was never considered.

The two-part key block, used for the first time on this job, proved most satisfactory, but the loose 3-in. cylinder in the joints was not depended on to hold the parts together. In later designs a wedge between the parts, in a slot provided by cores on opposite sides of the division plate in the standard block mold in which they are cast, fixes the parts firmly in the ring.

The corrugated steel shims in the joints of the rings contributed largely to the speed of erection and to the uniformity of the rings. Spalling or cracking of blocks during erection was almost entirely eliminated by the cushioning action of the shims. JOHN F. O'ROURKE,
Consulting Engineer.

New York City,
Sept. 18, 1931.

Registration of Land Surveyors

Sir—In *Engineering News-Record* of Aug. 13, 1931, on pp. 243 and 266-267, I find two very interesting papers on registration of engineers and land surveyors. Land surveying is there treated with more respect than it was in some registration laws a few years ago, and yet it seems that engineers still consider the land surveyor an inferior, judging from the fact that they are proposing less years of experience for registration as a land surveyor than as an engineer. In this connection it occurs to me that your reader would be interested in the paper by Ernest Van Meer, written two or three years ago. John W. Alvord said of it, "Every word in it has a meaning." You will notice it calls attention to the lack of education on land surveying in the colleges. Certainly land surveying is becoming more and more important as time passes. W. D. JONES,
Secretary Board of Examiners of
Land Surveyors, Cook County, Ill.

Chicago, Ill.
Sept. 4, 1931.

[Some extracts from the paper mentioned by Mr. Jones are given below.—EDITOR.]

The inevitable effect of the work of the incompetent surveyor is to create boundary disputes. Through ignorance he often destroys or distorts information of direct importance. . . . The public is at the mercy of this incompetent, for the result of any survey is expressed upon a plat, and how can the public know how much effort was actually spent in obtaining the results represented? The results are sometimes disastrous. . . . Almost all professional knowledge and skill (in land surveying) is within the ranks of the profession, and little, it seems, is in the schools. The schools teach the required mathematics and the use of the surveyor's or engineer's instruments; also much about other types or branches of surveying, but they do not teach the theory and practice of locating property lines. A survey requires accurate measurements and straight lines, it is true, but to determine a property line requires a careful investigation of conditions, good judgment in determining facts and ability to apply the law to the facts in the case. The work of the incompetent is a contribution toward strife and dispute. The work of the competent will ever be a safeguard to the rights of the property owner and will promote peace and security. The ability and judgment of a surveyor should be examined and determined, and the practice of land surveying should be limited to those who are able and willing to handle its problems.

NEWS OF THE WEEK

National Building Groups Launch New Construction League

REPRESENTATIVES of nineteen national associations, directly interested in construction, organized the Construction League of the United States at a meeting held in Washington Sept. 23 and 24. According to its founders, the league was formed to provide a general national leadership for the construction industry and for the purpose of establishing closer cooperation among the numerous elements of construction. Membership will be limited to 35 national associations whose major service or production is utilized in construction. Each member will be allowed two representatives and two alternates, the principal representatives to consist of the chairman or president of each association and the vice-chairman or vice-president. Dues will be $300 per year.

The league is to be incorporated in the District of Columbia and headquarters will be maintained at Washington. Meetings are to be held at least once a year. The following standing committees were provided for: policy, plan, employment, correlation, research, merchandising, public relations, and membership.

Officers of the first organization include: president, Robert D. Kohn, American Institute of Architects; first vice-chairman, Francis Lee Stuart, American Society of Civil Engineers; second vice-chairman, A. P. Greensfelder, Associated General Contractors;

(*Continued on page 587*)

Urge Home Products, Labor and Contractors for New York Work

The New York state joint legislative committee on unemployment will conduct a hearing in Rochester on Oct. 15 to consider elimination of out-of-state contractors, labor and products. The committee is understood to have called for the following action in a preliminary report to the legislature: Limit state contracts to firms residing within the state for at least one year; use materials produced within the state whenever possible; workmen employed must have resided within the state for at least one year; preference to be given workmen with dependents and without means of support; no fees to be charged or received for providing employment; and no labor camps to be established.

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Preliminary Work Begun on Colorado River Aqueduct

Road construction and other work preliminary to proposed construction of the Colorado River aqueduct by the Metropolitan Water District of Southern California was started Sept. 30 following the passage Sept. 29 of a $220,000,000 bond issue for the project. The issue carried by a vote of 224,379 to 46,384. Thirteen cities are included in the district.

To prevent an influx of job-seekers, W. P. Whitsett, chairman of the district's board of directors, has announced that only American citizens who have resided in the district for at least one year will be eligible for employment on the aqueduct.

Explosion in Sewage Tank Kills Two Men at Woonsocket, R. I.

AN EXPLOSION which ripped off the top of one of the sludge-digestion tanks of the Woonsocket, R. I., sewage-treatment plant on Oct. 2 killed two operators who were making an inspection of the tank. Although thorough investigation has disclosed no direct evidence as to the immediate cause of the explosion, it is believed that the lighting of a match by one of the men ignited gas within the tank. The following account is based upon facts supplied by P. B. Streander, of Remington, Vosbury & Goff, Camden, N. J., consulting engineers who designed the treatment works.

The plant, which has been in operation only five months, is of the activated-sludge type with presettling tanks and two separate sludge-digestion tanks, each having three compartments 90 ft. long, 15 ft. wide and 15 ft. deep. Power-driven wood scrapers return scum at the top to the influent end and move digested sludge along the bottom to the effluent end. Gas generated during digestion is collected at a raised section at one end of each compartment and is piped to a gas boiler to provide heat for the sludge tanks. Take-off domes are water sealed and the gas is passed through an expansion or pressure relief tank and a flame trap before reaching the boiler.

During the five months of operation only one tank has been in use. Sludge in its three compartments had reached a well-digested point and sufficient gas

VISITING ENGINEERS FROM GREAT BRITAIN INSPECT NEW McGRAW-HILL BUILDING

Members of the British Institute of Builders, who are inspecting building work in various American cities, on the roof of the new McGraw-Hill Building in New York as guests of the editors of Engineering News-Record and of the architect and builder of the building, Raymond Hood and William A. Starrett. The British visitors later attended the meeting of the Associated General Contractors in Washington, going from there to Pittsburgh, Chicago and Detroit. On Oct. 12-13 they will be in Toronto and on Oct. 15 will sail for home from Montreal.

was being generated to heat the water in the circulating system. Several days before the accident, the operator decided to place the three compartments of the second tank in operation and had taken digested sludge from the first tank to seed the second preparatory to the introduction of raw sludge. During this transfer the gas line leading to the boiler had been closed off, so that the heating system was not in operation when the accident occurred. All entrances to the tank had been opened to permit the escape of accumulated gas.

This was the situation when the two operators entered the tank to inspect the scrapers. One had emerged when the explosion occurred. The man still within the tank was blown upward through the entrance manhole, falling outside, while the second man, who was walking over the adjoining compartment, was also thrown into the air and fell back into the compartment, which contained a 3-ft. depth of sludge. Both were killed.

Examination of the damaged tank indicates that the explosion occurred inside the compartment at the end in which the operator was making his inspection. As this man did not carry a a light of any kind, wore rubber-soled shoes and carried no tools, the striking of an accidental spark seems impossible. It is therefore believed that he unthinkingly struck a match to help in making the inspection, possibly in the belief that the ventilated condition of the tank and the well-digested condition of the sludge had removed the hazard of explosion.

Civil Engineers' Board Acts on Work to Relieve Unemployed Engineers

ENTHUSIASTIC indorsement of the plan for the relief of unemployed engineers, submitted to the board of direction of the American Society of Civil Engineers, was given to the plan by the board at its meeting at St. Paul, Oct. 5-6. The plan was prepared by the board's committee on salaries headed by E. P. Goodrich. It already has been adopted by the Metropolitan Section of the society, as noted in last week's issue.

The board also adopted a resolution pointing out the great number of civil engineers unemployed, the universal benefit to the nation if work on topographic surveys, stream gaging, and studies of flood control and water resources could be expedited and urging upon Congress to appropriate at the earliest possible date $4,000,000 to be made available immediately to proper departments of the federal government for the prosecution of such surveys, gagings and studies at increased rate of speed during the coming year and further calling upon respective state officials to take necessary steps to participate fully with the federal government agencies in such approval of temporary expansions as may be initiated.

The board also adopted a resolution commending the President of the United States for his organization of national and local committees along non-partisan lines and for the outstanding men chosen to handle the unemployment problem which has arisen, also for consideration of various ways and means of avoiding in the future such dislocation of industry and resulting depression as now prevails throughout the civilized world. The board pledged support of and cooperation with these measures and will use its efforts to encourage members of the society individually to assist the work of the regularly constituted relief organizations.

The board approved in principle the program developed by public affairs committee of Engineering Council to enlist engineers in a constructive program looking toward relief of unemployment during present depression and to develop such plans as it can for permanent stabilization of employment.

New President Nominated

Herbert S. Crocker, consulting engineer, of Denver, was unanimously selected by the nominating committee as the candidate for president for the year 1932.

Winners of the society prizes for the year were announced as follows: Norman medal, Floyd A. Nagler and Albion Davis, the J. James R. Croes medal to John R. Freeman, the Thomas Fitch Rowland prize to Samuel A. Greeley and William D. Hatfield, and the Arthur M. Wellington prize to George F. Schlesinger. There will be no award of the Laurie prize or the Collingwood prize this year.

The board approved the recommendations of Alfred Noble prize committee of the award to C. T. Eddy, assistant professor of metallurgy, Michigan College of Mining and Technology. It also adopted a resolution of appreciation to Ambrose Swaney for a fourth generous gift to Engineering Foundation, and adopted a resolution in recognition of the late George F. Swain's many outstanding contributions as a man and engineer.

No Spring Meeting

In the interest of economy the board of direction decided that there would be no meeting of the society in spring at Miami, Fla., as proposed. The summer convention will be held at Yellowstone Park, but decision as to usual fall meeting was deferred. Representatives to American Engineering Council for two-year terms beginning January, 1932, were reappointed as follows: Baxter L. Brown, Louis L. Calvert, J. F. Coleman, A. J. Dyer, Frank M. Gunby, Charles H. Paul, and George T. Seabury.

Unemployment Relief Program

E. P. Goodrich, chairman of the committee on salaries, reporting to the board on unemployment, stated that at least 15 per cent of the civil engineers are out of work and at least 10 per cent in straitened circumstances and worthy of assistance. For immediate relief the following program to be carried out by the local sections was suggested and approved by the board of direction:

The creation in each locality of an organization committee of engineers.

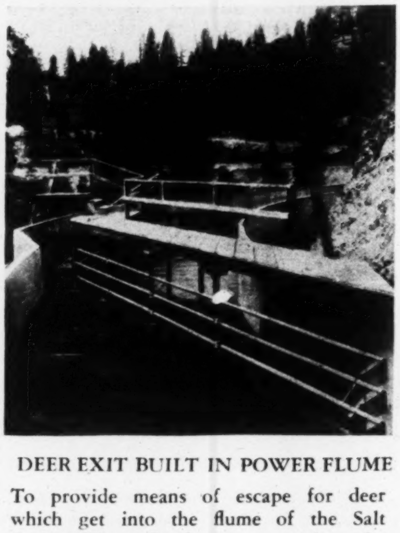
The collection by them of funds among employed engineers and others, for purposes of loan and remuneration.

A survey of the local engineers, unemployed and in need of relief.

A survey by such engineers of local opportunities for "made work" on which there can be utilized the much greater group of unemployed which are to be supported through the use of a community unemployment fund.

The preparation by those unemployed engineers of engineering analyses, estimates and organization requirements for each project.

The forceful presentation of such projects by the committee of engineers, to those in charge of the local civic unemployment activities.



DEER EXIT BUILT IN POWER FLUME

To provide means of escape for deer which get into the flume of the Salt Springs-Tiger Creek power project the Pacific Gas & Electric Co. has installed in the flume two exits of the type here shown. At the exit points the channel is widened from 14 to 19 ft. and bars are set across the flume at such an angle that an animal in the flume is directed to the exit ramp.

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Work Curtailed on Middle Rio Grande Conservancy Project

The Middle Rio Grande conservancy project, in the vicinity of Albuquerque, N. M., recently laid off 400 men from its payroll, cut its dragline fleet from ten machines to eight, cut its office force and is maintaining a force of only 100 men, of which 80 will be on the Cochiti division, which is under federal aid. Failure of loan agreements and exhaustion of funds are given as reasons for closing down the $13,000,000 project.

Construction League Organized

(Continued from page 585)

treasurer, H. H. Sherman, Producers Council, Inc.; general secretary, P. W. Donoghue, National Association of Master Plumbers of the United States; joint secretariat, E. J. Harding, Associated General Contractors, L. W. Wallace, American Engineering Council, and E. C. Kemper.

Associations represented at the organization were: American Engineering Council, American Federation of Labor Building Department, American Institure of Architects, American Institute of Steel Construction, Associated General Contractors of America, Contracting Plasterers' International Association, Electrical Guild of North America, Heating and Piping Contractors National Association, International Cut Stone Contractors' and Quarrymen's Association, International Society of Master Painters and Decorators, National Association of Builders' Exchanges, National Association of Building Trades Employers, National Association of Marble Dealers, National Association of Master Plumbers of the United States, National Association of Ornamental Iron and Bronze Manufacturers, National Association of Sheet Metal Contractors, National Committee of Building Congresses, Producers Council, Inc., and the United Association of Journeyman Plumbers and Steamfitters and Building Trades Department.

Reinforcing Steel President Reviews His Industry's Problems

At the semi-annual meeting of the Concrete Reinforcing Steel Institute at Shawnee-on-the-Delaware, Pa., O. W. Irwin, president of the Institute and vice-president of the Truscon Steel Co., directed the remarks in his address to the industry's competitive problems. In reviewing the results of the cooperative promotional work of the Institute, Mr. Irwin noted the following accomplishments: increasing the tariff on imported steel, advocating ribbed concrete construction in the lighter occupancy buildings, and promoting heavy reinforcing in concrete roads.

Present business is particularly unsatisfactory. The sales of Institute members for the first half of 1931 were 26 per cent below the sales of the first half of 1930, while shipments were off 21 per cent for the same period. Sales loss is more severe in the Pittsburgh tonnage district than in any other. The only increase in types of shipments is for road tonnage, and this has caused a marked increase in direct mill shipments.

In analyzing the present business situation, Mr. Irwin stated the two alternatives open for the members of the Institute, either to go into corporate dissolution or bankruptcy, or else aggressively to attack the selling problem with more clear thinking, less self-satisfaction and more consideration for employees.

Bonds Approved for New Orleans Belt Railroad Bridge

Approval of the issuance of $7,500,000 in bonds with which to defray its share of the cost of construction of the bridge across the Mississippi River at New Orleans has been voted by the New Orleans Public Belt Railroad Commission, the advertisement and sale to be handled by a committee with the advisement of R. S. Hecht, local representative of underwriters of the issue. The bonds are to be tax free, as municipal issue, and will carry the guarantee of the Southern Pacific Lines.

While approval of the bids of contractors on the four major contracts is being obtained from all authorities and agencies involved, plans will be advanced for application for an extension of completion time from Aug. 15, 1933, to a later date. It is understood that the Chief of Engineers has been approached and found in sympathy with the proposal, and a bill granting extension will be introduced in the coming session of Congress. The contractors have extended their bids to Dec. 31.

National Registration Bureau Favored by Examiners

Establishment of a national bureau of engineering registration was approved by the National Council of State Boards of Engineering Examiners at the Council's annual convention held in Detroit, Oct. 1-3. The establishment of such a bureau as the best means of establishing uniform registration throughout the country was proposed some months ago by T. Keith Legaré, retiring president of the Council. A committee was appointed by the president to work out the details of the organization of such a bureau. The national engineering societies will be asked to appoint representatives to the committee.

The Council decided to continue its work for a uniform registration law, and T. Keith Legaré was named as its representative on the joint committee of the national socities which is studying that subject.

Classification of engineering colleges was recommended by the Council's committee on accredited engineering schools. The committee was instructed to proceed with the work. A standard system of examinations also was recommended to the Council by its committee on that subject.

Reaffirmation of the essential unity of the engineering profession was made in a resolution adopted by the Council. The resolution opposed any legislation tending to break down the solidarity of the engineering profession.

Eighteen of the state boards of engineering examiners in the 24 states now having license or registration laws were represented at the meeting, as well as American Engineering Council and four of the major engineering societies. The new officers are: president, D. B. Steinman, New York, N. Y.; vice-president, N. T. Kinzly, Nashville, Tenn.; secretary-treasurer, T. Keith Legaré, Columbia, S. C. The next convention of the Council will be held in New York City. Speakers at the annual banquet were D. P. Steinman, president, New York State Society of Professional Engineers, and W. E. Wickenden, president of Case School of Applied Science, Cleveland.

Fifth Impartial Wage Board Named in San Francisco

An impartial wage board has been appointed by the industrial associations of the East Bay and San Francisco to survey conditions in the building trades and recommend wage scales in the San Francisco Bay area for 1932. The members of the board are: Dean Willard E. Hotchkiss, of the school of business administration, Stanford University; Will J. French, director of the industrial relations department of the State of California; and Henry J. Brunnier, San Francisco structural engineer. This is the fifth impartial wage board to be organized in the Bay district.

The San Francisco Builders Exchange asked that the wage scale be moved downward at once, but the industrial association refused this request because it had guaranteed the San Francisco building trade mechanics and laborers that the 1930 impartial wage board's scale in the various trades would be maintained throughout 1931. (*ENR*, May 28, 1931, p. 908.)

The present wage scale ranges from $5.50 a day for common laborers to $11 a day for master plasterers, bricklayers and structural steel workers. Laborers are paid on the basis of a six-day week, skilled workers on a five-day week.

Atlantic Deeper Waterways Association Meets in Boston

Civil engineers from many points on the Eastern seaboard were in attendance at the annual convention in Boston Oct. 5 of the Atlantic Deeper Waterways Association. A number of U. S. Senators and Congressmen were also on hand.

The needs of further development of the Cape Cod Canal, already recommended by army engineers, were brought to the attention of the engineers, who were taken on an inspection trip of the canal on Oct. 6.

The merits of the St. Lawrence waterways project was discussed by Henry I. Harriman, president of the Boston Chamber of Commerce, and former Congressman Peter H. Ten Eyck, of Albany, N. Y.

Frank S. Davis, manager of the maritime association of the Boston Chamber of Commerce, outlined the most pressing needs of Boston harbor from an engineering standpoint.

Briefly these were: dredging the main inner ship channel, removing the middle ground off Governors Island, deepening and widening Weymouth Fore River and dredging a channel through Dorchester Bay.

New England Libraries Lack Engineering Books

New England libraries lack books on engineering subjects, it is reported by Julian A. Schon, of New York, who has just completed an extensive survey of library conditions in the principal cities of New England. The cities visited included Boston, Springfield, Hartford, New Haven, Bridgeport, Worcester, Waterbury and Providence.

Mr. Schon is chief bibliographer of the Engineering Societies of New York. His inquiry was to determine how far the public library in New England is meeting the requirements for technical literature and to obtain suggestions for extending the work of the Engineering Societies library. His report suggests that the situation might be improved by the organization of a committee of engineers in each large New England city to consult with the librarian in the selection of books and periodicals and to advise on books that are out of date.

Mr. Schon asserts that librarians suffer from a lack of technically trained assistants and from inability to judge the value of strictly engineering books and treatises. He said that the Boston Engineering Societies library could aid in solving these problems by offering advice on the purchase of adequate technical literature, by answering inquiries of librarians and engineers and by supplying bibliographies that would be of value in building a collection.

Harbor and River at Oswego, N. Y., to Be Improved

Engineers are surveying the lower Oswego River, from Seneca St., Oswego, N. Y., to deep water in Oswego harbor, under the direction of H. V. Donaldson, of the district engineer's office at Buffalo. It is expected that data will be ready within a few weeks, and that contracts will be let in November. The work will include the removal of two islands in the Oswego River, and deepening Oswego harbor to 21 ft. at low water. The estimated cost of the work is more than $800,000.

◆

Complete Topographical Map of United States Advocated

Broadening the scope of the activities of the U.S. Geological Survey in order that the federal government may cooperate with states and municipalities in mapping all important areas of the country on a scale that will assure precise and accurate topographical data and produce substantially a new composite map of the United States upon such a scale will be advocated in the next Congress by Senators Wagner and Copeland, of New York, they announce. Such legislation has been proposed by the Regional Plan Association of New York as a means of affording nationwide employment for large numbers in an enterprise that will constitute a real and permanent public service.

Technical Training Improves Status of Young Engineers

Technical college training gives the young engineer a definite advantage over men of inferior training, according to a survey recently completed by the American Society of Mechanical Engineers. More than 9,000 mechanical engineers reported on their income for 1930, and the survey covered all fields into which such engineers go.

Between the ages of 25 and 35 years the graduate engineer earns on an average $500 more than the untrained man. Beyond 35 years the difference increases to $1,000 until an age of 45 or 55 years is reached. After 55 years the men with standard engineering school training appear to forge ahead of those who have extended their training by graduate study. This, the society's committee on the economic status of the engineer believes, is because the latter class tend to stay in strictly research work whereas many of the others become executives.

Teaching and railroad work were found to be the poorest paid classifications. Aside from these fields all fields offer about the same opportunities. Generally, those men who do not combine technical skill with executive ability do not reach the higher salary classifications.

◆

Progress of Work on Montreal's New Railway Terminal

With somewhat less than a year's work done on the Canadian National Railway terminal at Montreal, already a good showing has been made. Several of the minor unit parts of the undertaking have been completed; others are nearing completion, and the major parts are well under way. The excavation of the station site, with the removal to date of 660,000 cu.yd., is a little more than half finished. Earth and rock already removed has been used to build up the new passenger coach yards at Point St. Charles. This filling work is more than three-quarters done.

Work on the viaduct has been progressing steadily on sections beneath St. Antoine St. and William St., and the viaduct is now about half finished. Two stories high, 112 ft. wide, it will extend for 2,000 ft.

The foundations of the four-track vertical lift bridge to be constructed over the Lachine Canal south of Wellington St. are completed and the most troublesome part of the work on this undertaking is out of the way. Three subways, at St. Remi St., Hibernia St. and Charlevoix St., and two bridges over the tracks from the Bonaventure station to Turcot yards, at Guy and Mountain Sts., are completed and already in use. Work on the Dorchester St. bridge is already well advanced, and the steel work about 75 per cent. completed. This structure is 650 ft. long, 104 ft. wide and 50 ft. high.

A description of this new terminal was given in the issue of Oct. 9, 1930, p. 562.

BUILDING A WATER TUNNEL IN BALTIMORE

JUNE 25 1931

Keystone Photo

Looking into one of the headings of the Montebello-Druid conduit in Baltimore, Md., which will connect the filtered water reservoir at the Montebello filtration plant with Druid Lake, a low-service balancing reservoir. The completed tunnel, with a length of 14,000 ft. and a minimum diameter of 112 in., will inclose an 84-in. reinforced-concrete pipe. The annular space outside of this pipe is to be filled either with concrete or dry rubble masonry. The Whiting-Turner Construction Co., Baltimore, is the contractor.

Unemployment Relief Plans in Canada

According to an official statement issued by Gideon Robertson, dominion minister of labor, the number of unemployed in Canada is about 530,000, as indicated by the registration of the different provinces. He estimates that relief expenditures of at least $100,000,000 will be required next winter. Authority to proceed with unemployment relief works to be aided by the dominion government has been received and is being acted upon by several provinces. The dominion will pay 50 per cent of the cost of works undertaken by provinces and in some places will undertake works on its own account. Last winter the dominion and provinces paid 25 per cent each of municipal undertakings, but this season the contribution of the dominion may be largely increased in the case of municipalities that are in financial difficulties.

◆

President's Conference on Home Building to be Held Dec. 2

President Hoover's conference on home building and home ownership, for which preparations have been in progress for more than a year, will be held in Washington, Dec. 2 to 5. This conference, organized under the chairmanship of Secretary of Commerce Lamont and of which John M. Gries is executive secretary, will deal with the whole question of home construction and ownership and of home environment. It will embrace finance, design, equipment, city planning and household management.

In announcing the meeting President Hoover says: "Twenty-five committees, headed by men and women of authority and experience in various phases of the question, have been engaged for months in gathering and analyzing available information and in making additional studies and inquiries. Their work is being correlated so that on the basis of the facts a collective judgment may be formulated upon the best contemporary experience of leaders who have special knowledge of the subjects. It obviously is not our purpose to set up the federal government in the building of homes. But the conference will, I believe, afford a basis for the development of a sound policy and inspire better voluntary organization to cope with the problem."

◆

New Building for Ontario Power Commission

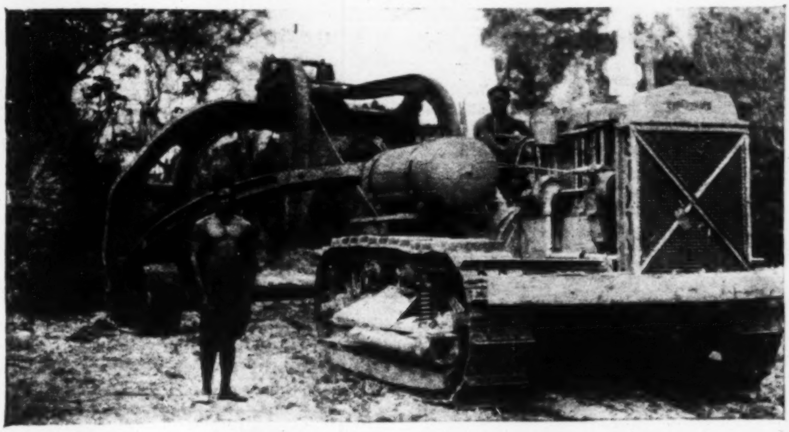
Plans for a new administration building for the Ontario Hydro Electric Power Commission at Toronto are in preparation, and construction work is expected to start this fall. The new structure, virtually an extension of the present administration building, will be fourteen to seventeen stories high, and will cost about $2,000,000.

◆

Progress on the Congo Railway

The Congo Railway, in French equatorial Africa, designed to extend from the Atlantic port of Pointe Noire to Brazzaville, on the Congo River, 365 miles, is now expected to be finished in 1934. It was commenced in 1921 and was to be completed in ten years. Its purpose is to supersede navigation on the lower Congo, which is hampered by rapids and a swift current, while above Brazzaville there is regular steamer navigation for several hundred miles inland.

From Pointe Noire the line, of 3½-ft. gage, is completed for 60 miles, beyond which a 24-in. construction line extends 20 miles and is used for traffic. From Brazzaville the line has been completed eastward for 100 miles to Mindouli, while a highway for automobiles and trucks temporarily serves the 190-mile gap. Work on the railway is reported to be progressing actively, considerable American machinery being used by the French contractors. The accompanying illustration shows the removal of large trees from the right-of-way, with equipment such as is used in heavy logging operations in the United States. The tractor, operated by a native, is hauling a crawler-mounted steel arch frame with fair-lead rollers on top for the logging cable. Two tractors are required to handle some of the enormous trees.



American machinery in the African jungle

Railroad Underpass Opened in Oakland, Calif.

The Seventh St. underpass for automobile traffic ander the tracks of the Southern Pacific Railroad on the way to the Oakland, Calif., mole auto ferry has been completed and open for traffic. This underpass was constructed by the city of Oakland and the Southern Pacific Railroad at a cost of $200,000. The contractor on the job was J. F. Knapp, Oakland, Calif.

◆

Standard Mechanics Lien Law Submitted by Committees

Submitted by committees of the department of commerce and the National Conference of Commissioners on Uniform State Laws, the latest and probably final draft of the standard state mechanics lien act was tentatively adopted at the annual meeting of the conference Sept. 14 in Atlantic City. With final indorsement next year, the model act will be referred for consideration by the American Bar Association. The vote in the conference was 26 to 6. Several state delegates still pressed their objections to inclusion of provisions under which misapplication, with intent to defraud, of loan funds by the owner, contractors and subcontractors who have incurred debts for construction becomes a criminal offense. It was the opinion of the majority that a law intended as a guide for state legislation must have some teeth in it. All the states have some form of mechanics lien law, no two of which are exactly alike and some of which are too preferential of one party or the other, or are ineffective.

All drafts of the act that has been in preparation since 1925 have provided for some form of notice by lienors to the owner and for a statement under oath by the contractor to the owner. The latest revision represents a studied effort to work out in an equitable manner the burdens and benefits of procedure in consonance with adequate protection. Incorporation of its provisions into state statutes, it is hoped, will have a beneficial effect on the credit situation in the construction industry. In unanimous agreement on the basic principles of the act, the committees also have tried to anticipate litigation that usually arises in the administration of a new law.

The act provides that the contract price is the limitation of lien liability if the owner observes its provisions, that all liens shall attach from the time of the visible commencement of operations on the site, that lienors other than laborers may give an informal notice of intention to claim a lien within 30 days after starting their work, and that after receipt of such notice, the owner may make payment of the amount due direct to the lienor who has served the notice unless the contractor produces a receipt or waiver of lien signed by the lienor.

Federal Expenditures for Relief of Unemployment

The President's Unemployment Relief Organization reports expenditures contracted for during the first half of 1932 of $373,593,000. It also reports that the total expenditures of the federal government in aid of unemployment since the depression began (omitting drought relief) will by the end of the present fiscal year aggregate more than $1,550,000,000.

The following table shows the prospective expenditures for the first half of 1932, compared with 1931 expenditures:

	First Half 1932	1931
Public buildings and lands	$126,980,000	$148 054 000
Construction other than buildings and construction work by Engineer Corps	95,737,000	147,265,000
Works under direction of Engineer Corps	40,000,000	94,746,000
Repairs and maintenance	37,283,000	88,605,000
Roads	73,593,000	259,897,000
Total	$373,593,000	$738,567,000

◆

Trans-Canada Highway Route Definitely Fixed

The route of the trans-Canada highway, through the provinces of Alberta and Saskatchewan, has been decided upon, completing the link-up into one highway from Vancouver through British Columbia, Alberta and Saskatchewan to Manitoba. In Alberta the route will be by way of Banff, Calgary and Medicine Hat, and the ultimate standard to which the road will be brought will be discussed with dominion officials in the near future. All of the 380-odd miles of highway through the province, except a gap of 60 miles between Brooks and Redcliffe, is already completed up to a standard in use for motor traffic. From Brooks to Kininvie, 23 miles, the road will require both grading and graveling; the rest of the 60-mile gap will require graveling only.

In Saskatchewan, No. 1 highway, which enters the province at Fleming on the east and passes through Regina, Moose Jaw, Swift Current and Maple Creek, has been designated as the route of the highway. This route, about 400 miles long, is already practically complete, and special arrangements for its maintenance will be made with the federal government. The Saskatchewan government also intends to bring one or two of its northern east-west routes up to trans-Canada standards.

◆

Florida Collects Less Revenue From 7c. Gas Tax

The State of Florida collected $82,908.37 less revenue from its 7c. gasoline tax during August than it did from its 6c. tax during July, complete figures at the state comptroller's office reveal. The first month the increased gasoline tax was in effect total revenue from the levy dropped from $1,777,940.70 to $1,695,031.33 and total consumption fell from 19,632,345 gal. to 15,643,319 gal.

Preliminary Work Started on San Francisco-Oakland Bay Bridge

Engineering offices for the San Francisco-Oakland Bay bridge were opened on Sept. 15 in San Francisco at 500 Sansome St. Charles E. Andrew, bridge engineer for the California state department of public works, will be in charge. The consulting board for the project consists of Ralph Modjeski, chairman; Moran & Proctor, L. S. Moisseiff, Charles Derleth, Jr., and H. J. Brunnier.

At present the work consists more or less of preliminary design, investigations and estimates, including the construction of models, covering three distinct types of suspension structure between San Francisco and Yerba Buena Island. One of these models has been completed and all data have been obtained. The two other models are to a great extent complete in their constructive states, but as yet complete data have not been obtained. It is expected that this model work will be completed within the next two months. The process of organizing a designing force is going forward as rapidly as possible, and will probably be recruited to full strength by Jan. 1.

A contract for final borings is being advertised and the bids will be opened some time this month. These borings will furnish final data for the design of foundations. As soon as sufficient data are obtained on any of the piers, design will immediately be started on them. It is hoped that within ten months, or at most a year from date, the department of public works will be able to award the first contract for foundation work.

◆

Maine to Open New Toll Bridge

The Maine state highway department this month will open a toll bridge over the Kennebec River, connecting the towns of Richmond and Dresden. The new bridge is 1,272 ft. long and consists of six fixed spans and a draw span. It has a roadway 20 ft. wide and 10 ft. above mean high tide. The draw span is of sufficient length to leave a clear opening of 70 ft. on either side of the draw pier to allow for the passage of river craft. The bridge will be operated on a 24-hour a day service throughout the year, whereas the ferries had only a 24-hour summer service, traffic ceasing after dark in the spring and fall.

◆

Contract Let for New Bridge in British Columbia

The contract for the new steel and concrete bridge over the Thompson River, at Ashcroft, B. C., has been awarded to the engineering firm of Moncrieff & Vistaunet, of Vancouver. The total cost of the work will be about $155,000. The bridge will be 75 ft. long, and completion is guaranteed by June 1 of next year.

Baltimore Mayor Appoints City Engineering Heads

Mayor Howard W. Jackson, of Baltimore, on Sept. 28 sent to the city council the names of many of his appointees to head the city's engineering bureaus. The appointments, all of which were confirmed by the council, were effective on Oct. 1.

Bernard L. Crozier, chief engineer, was reappointed. He heads the department of public works, which includes all the engineering bureaus of the municipality. Mr. Crozier was appointed chief engineer last spring, succeeding Charles F. Goob, resigned.

Leon Small was appointed engineer of the bureau of water supply, succeeding Edward G. Rost. George Cobb was named highways engineer, succeeding Nathan L. Smith. Frederick M. Kipp, Jr., a civil engineer, will succeed Elmer E. Hammond as harbor engineer. W. Rayner Straus was appointed head of the bureau of mechanical-electrical service, a position that has been vacant since the resignation of Warren Viessman several months ago.

Edward J. Hecker was named head of the bureau of plans and surveys, succeeding William O. Atwood. Mr. Hecker was elected city surveyor last year to succeed himself. In appointing him Mayor Jackson said he will be able to abolish the salary of one of the offices. He also said he will revive the city planning commission and will appoint Joseph W. Shirley chairman. William A. Parr, a contractor and builder, was appointed engineer of buildings, succeeding Walter G. Hammond. Conrad Zieget, Jr., head of the bureau of standards, was reappointed.

Joseph S. Bopp, who has been connected with the Baltimore & Ohio R.R. for a number of years, was named head of the bureau of transportation, a post that has been vacant since the resignation of Charles W. Pohlman several months ago. A. Frederick Schlee was named engineer of street cleaning. He succeeds Covington K. Allen, who has been named deputy engineer.

◆

Metropolitan Sewage System Urged for Seattle

As the first step toward ultimate establishment of a metropolitan sewer district serving Seattle, Wash., and the suburban area north of the city and around Lake Washington, E. French Chase, sanitary engineer, city streets and sewers department, is urging immediate appropriation of $50,000 by King County commissioners to make a topographical map of the district involved. The survey is urged by Mr. Chase as a necessary step toward providing sewage facilities for areas not now served, for relocation of the present system, to prevent continued contamination of Lake Washington and to locate disposal and pumping plants. The cost of the metropolitan sewer system contemplated is said to be between $35,000,000 and $50,000,000.

Emergency Work to Be Promoted by State Engineering Committees

State engineering committees are being organized by American Engineering Council to assist in promoting employment relief by increased work and by spread work. A call to these committees, just issued by L. W. Wallace, executive secretary, asks that they organize the engineers and local engineering groups in the state to (1) cooperate with corporations and public officials in bringing about increased employment and spreading work by shortening working hours, and (2) study the possibilities of long-time planning in industry and government to stabilize employment through the years.

These committees are asked to cooperate with all public and private bodies that are concerned with unemployment relief and to carry on public education on unemployment relief methods and stabilization possibilities.

A "program of action" prepared by the Council's committee on relief from unemployment, F. J. Chesterman, chairman, is being sent out with the call for state committee organization. The program contemplates that every engineer within his sphere of influence shall study how employment can be spread and how his business can be stabilized; shall seek to have the resulting plans adopted in that business; and shall report to his society on methods of stabilizing employment, the society then to analyze and assimilate the resulting information and carry on public education concerning it through discussion and publicity. Cooperation of societies with all worthy unemployment relief work is included in the program.

◆

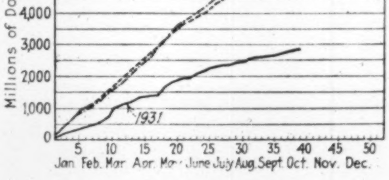
Capital and Contracts

Total new capital issued in the week of Oct. 3 was $23,000,000, of which but $3,000,000 came under the public classification.

Two municipalities in New York and one in New Jersey launched new securities, while $20,000,000 went for privately owned public utilities.

In the first week of September there were no private issues and only $6,000,000 in public bonds. Weekly average for October, 1930, was $78,000,000.

Cumulatively, new capital for construction issued thus far in 1931 amounts to $2,839,000,000, compared with $5,278,000,000 in the corresponding period last year.



M. R. Eccles New President of Utah Construction Co.

At a meeting of the Utah Construction Co. in Ogden, Utah, on Sept. 21 Marriner S. Eccles was elected president to succeed William H. Wattis, recently deceased. E. O. Wattis was elected chairman of the board of directors, L. S. Corey vice-president and general manager and Herman Way secretary-treasurer. The Utah company is one of the members of Six Companies, Inc., builder of Hoover Dam.

◆

Hoover Dam Notes

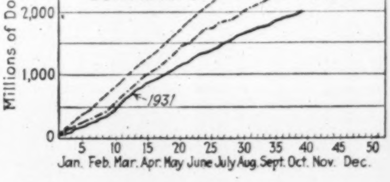
A total of 2,485 workmen is now engaged at Hoover Dam. Work progressed rapidly on the tunnels during the week ended Sept. 26. A total of 917 ft. of pioneer tunnels was driven during the week. Crews worked from eleven headings, driving 160 ft. of headings in one 24-hour period. Total headings for each tunnel are: outer Nevada, 619 ft.; inner Nevada, 2,372 ft.; inner Arizona, 21,506 ft.; outer Arizona, 225 ft.

Sims Ely, of Arizona, has been appointed city manager of Boulder City by Secretary Wilbur. He will report to Construction Engineer Walker R. Young. Two representatives of the government and one of the contractors will comprise an advisory committee to assist in the management of the town.

Track is being laid at the rate of more than 3,000 ft. a day on the Six Companies' railroad.

Representatives of the manufacturers of the new 4,000,000-lb. testing machine at the Denver laboratory will inspect its operation in the near future. Special attention will be given to the reactions in the machine and foundations after breakage of test cylinders. In preparation for this inspection two 36x72-in., two 24x48-in., three 12x24-in., four 8x16-in., and four 6x12-in. test cylinders have been made. In addition to a study of the reactions by the breaking of these cylinders, it it planned to obtain data on a new tentative standard rate of loading of test cylinders and the effect of cylinder size on the compressive strength, the same mix being used in all these cylinders.

At Boulder City during the week 12,270 cu.yd. of material was moved in the course of street construction. Construction of the administration building and the dormitory has been delayed due to the non-arrival of structural steel and frames for windows and doors.



WASHINGTON NOTES

By PAUL WOOTON
Washington Correspondent

Lower Constraction Costs Lead War Department to Ask Larger Grant for Rivers and Harbors

IN ORDER to take advantage of lower construction costs, the war department has asked the bureau of the budget for a larger rivers and harbors appropriation bill this year. The last regular rivers and harbors bill carried an appropriation of $60,000,000. This year the army engineers are requesting $75,000,000. In addition to the regular appropriation, funds for rivers and harbors work were augmented last year by a fund of $22,500,000 which was made available in the emergency construction appropriation bill.

Whether or not there will be an emergency appropriation bill at this session for construction work will not be determined until Congress has received special reports from the various departments. Some members of Congress already have gone on record as favoring additional waterway work. The amount requested for flood-control work this year is the same as was obtained last year—$35,000,000.

Engineer officers report that all construction work has shown a decline in cost. The reduction has been the greatest in levee work. It is estimated that it is now possible to do for the same cost one-third more levee work than was possible several years ago. The decline in cost has been greater in work done under contract than in that done by day labor, because contractors generally have cut wages, whereas the Corps of Engineers is maintaining previous levels.

Two Contracts Awarded for Sunnyvale Airship Dock

Two contracts have been awarded for the initial work on the dirigible dock at the naval air station at Sunnyvale, Calif. Including the construction of barracks, service buildings and a helium-purification plant, the project will involve an expenditure of $5,000,000. The contracts that have been awarded so far include the structural steel work and the covering for the dock. On a bid of $1,116,044 the Wallace Bridge & Structural Steel Co., of Seattle, obtained the contract for the steelwork. The Siems-Helmers Co., of St. Paul, was awarded the contract for covering the dock for $398,937.

Although it has been determined that the Capital Construction Co., of Sacramento, with a bid of $169,400, is the low bidder for the foundation and grading work, no award has as yet been made for this part of the project. In general, the new dock will adhere to the design of the one built at Akron incidental to the construction of the new naval airship. Particular attention has been given to earthquake stresses, however, in the design of the structure at Sunnyvale. The helium-purification plant will be equipped with a 2,000,000-cu.ft. low-pressure gasometer. The ultimate storage capacity will be 6,000,000 cu.ft. Natural gas will be used for heating the buildings at the air base. As power will be purchased, it will only be necessary to provide a stand-by plant. As a consequence there has been a gradual change in the ratio between the work done by government plant and the work let under contract. Two years ago 60 per cent of the work was done by government plant; last year this was reduced to 50 per cent; now it has fallen to 40 per cent.

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Personal Notes

Warren T. Hannum, lieutenant colonel, Corps of Engineers, who has been in charge of the South Atlantic division, with headquarters at Baltimore, took charge of the Gulf of Mexico division on Oct. 1, relieving Lieut. Col. Mark Brooke, who has been ill.

C. W. Engle has been appointed division engineer of the northern division of the Cleveland, Cincinnati, Chicago & St. Louis Ry., with headquarters at Van Wert, Ohio, vice W. D. Williams, transferred.

Edwin K. Morse, of Pittsburgh, has been reappointed as engineer member of the Pennsylvania water and power resources board. The duties of this board are the regulation of the dams or any structure or obstruction in, along, across, under or extending into any river, stream or body of water within or along or forming the boundary of the commonwealth.

John T. Schooley, Zanesville, has been appointed state architect and engineer of Ohio, succeeding T. Ralph Ridley.

Roy D. Likins, materials inspection engineer, announces the opening of an office for materials inspection service in Little Rock, Ark.

COSTS AND CONTRACTS

ENR Index Numbers

Cost		Volume		
Oct. 1, 1931	**169.78**	**Sept.,**	**1931**	**225**
Sept. 1, 1931	171.40	August,	1931	187
Oct. 1, 1930	198.72	Sept.,	1930	232
Average, 1930	202.85	Average,	1930	260
Average, 1929	207.02	Average,	1929	317
1913	100.00	1913		100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Oct. 8, with some comparisons, total as follows:

(In Thousands of Dollars)

	Oct. 8, 1931	Average of Last Four Weeks 1931	Average of Last Four Weeks 1930
Buildings:			
Industrial	$1,907	$4,390	$5,185
Other	8,582	13,810	23,180
Streets and roads.	8,240	7,340	11,415
Other construction.	7,988	15,411	14,814
Total	$26,717	$40,952	$54,595

Total, all classes, Jan. 1 to Oct. 8:

1931	$2,046,603
1930	2,677,138

SOCIETY CALENDAR

AMERICAN INSTITUTE OF STEEL CONSTRUCTION New York City; annual meeting, White Sulphur Springs, W. Va., Oct. 28-30.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; fall meeting, St. Paul, Minn., Oct. 7-9.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, St. Louis; meeting, Oct. 19-26, Pittsburgh.

ASSOCIATION OF WESTERN STATE ENGINEERS, fourth annual conference, Sacramento, Calif., Oct. 28-30.

INTERNATIONAL CITY MANAGERS ASSOCIATION, Chicago; annual meeting, Oct. 7-10, Louisville, Ky.

NATIONAL MUNICIPAL LEAGUE, New York City; annual meeting, Nov. 9-11, Buffalo, N. Y.

NATIONAL SAFETY COUNCIL, New York City; twentieth annual safety congress, Chicago, Oct. 12-16.

ALABAMA SECTION, American Society of Civil Engineers, at its first fall meeting, held in Birmingham, had as its honor guest Major Gen. William L. Sibert, chairman and chief engineer, Alabama state docks commission. Gen. Sibert addressed the section, describing the work of the commission.

AMERICAN ASSOCIATION OF ENGINEERS at its seventeenth annual meeting in Huntington, W. Va., Sept. 27 to 30, elected officers as follows: president, Erle K. Ramsey, Oklahoma City; vice-president, Vic H. Housholder, Phoenix, Ariz.; secretary, M. E. McIver, Oak Park, Ill.; treasurer, H. W. Clausen, Chicago. By resolution the association pledged to President Hoover its full support, indorsed the movement to preserve as a national monument George Washington's surveying headquarters used in the survey of the city of Washington, and urged the formation of student chapters as a means of fostering professional unity and promoting ethics and professional standing. The unemployment problem is to be researched by a special committee. The welfare foundation committee, which brought in a progress report, was urged to complete its conclusions soon. James H. Griffin in his presidential address advocated a six billion dollar public-works program for unemployment relief.

NEW ENGLAND SECTION, Society for the Promotion of Engineering Education, will hold its fall meeting in Providence on Oct. 10. C. F. Hirshfeld, chief of the research department, Detroit Edison Co., will tell of the investigation made by the Society of Mechanical Engineers on the economic status of the engineer, and Harvey N. Davis, president, Stevens Institute of Technology, will discuss engineering education in the light of this investigation. Other speakers will be Prof. Will S. Taylor, of Brown University, and A. D. Mead, acting president of Brown.

NEW ENGLAND SEWAGE WORKS ASSOCIATION will hold its fall meeting in Providence on Oct. 19, and not on Oct. 10, as erroneously stated in the issue of Sept. 24.

WASHINGTON STATE ASSOCIATION OF COUNTY ENGINEERS at its annual meeting in Spokane Sept. 24-26 indorsed the proposal for registration of engineers, and elected officers as follows: president, Charles R. Deako; vice-president, J. C. Stegner; secretary-treasurer, Ross E. Alverson. Olympia was selected for the 1932 meeting.

VIRGINIA WATER AND SEWAGE WORKS ASSOCIATION will hold its third annual meeting in Lynchburg, Nov. 16-17. The secretary is H. W. Snidow, Richmond, Va.

Obituary

Willis Appleford Slater, research professor of engineering material and director of the Fritz Engineering Laboratory at Lehigh University, died suddenly on Oct. 6 at his home in Bethlehem, Pa. He was 53 years old. Prof. Slater was an authority on reinforced concrete and was chairman of the joint committee on standard specifications for concrete and reinforced concrete. In 1919 the American Concrete Institute awarded him the Wason medal for his work with the emergency fleet organization during the World War. He was a member of the American Society of Civil Engineers, the American Society for Testing Materials, the American Concrete Institute, the American Association of Engineers, the American Railway Engineering Association, the Americna Welding Society and the American Association for the Advancement of Science.

Ernest McCullough, consulting engineer, of New York City, died at his home in Queens County on Oct. 1 after a short illness. He was 64 years old. Mr. McCullough was educated as an engineer at the Institute of Technology in Chicago and settled in San Francisco in 1887 as a practicing engineer and in 1898 moved to Lewiston, Idaho. Mr. McCullough was well known as an editor of various technical and trade journals. He was also the author of numerous works on engineering. Mr. McCullough was a member of the American Society of Civil Engineers, the Society of Civil Engineers of France and the British Institute of Structural Engineers, being a medalist in 1925 of the last-named society.

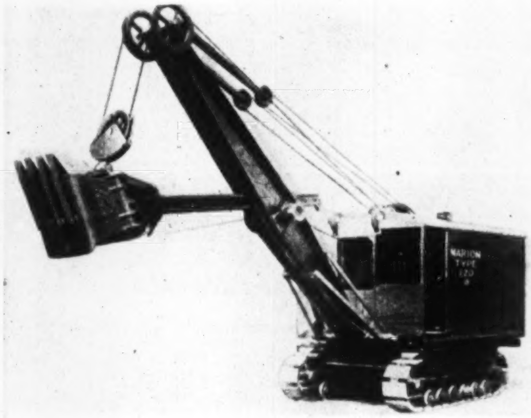
Alfred J. Henry, editor of the *Monthly Weather Review* of the U. S. Weather Bureau, died on Oct. 5 in Washington, D. C. He was 73 years old. Mr. Henry entered the meteorological division of the Signal Corps in 1878 and in 1895 became chief of the meteorological records division of the Weather Bureau. He was a member of many technical societies and was formerly secretary of the National Geographic Society.

Edward M. Lowrance, levee contractor, died at his home in Memphis, Tenn., on Sept. 29. Mr. Lowrance, was 45 years old and had been in ill health for four years. With his brothers he formed the partnership of Lowrance Bros. & Co. a few years ago and the firm operated largely in Memphis, Vicksburg and other engineer districts of the Mississippi Valley.

Edward Alfred Simmons, president of the Simmons-Boardman Publishing Co., died of cerebral hemorrhage at his home in Brooklyn, N. Y., on Oct. 1. He was 56 years old. During the World War Mr. Simmons was a major in the construction division of the army and supervised army construction work in and around New York. He was a member of the American Society of Civil Engineers.

Construction Equipment and Materials

Small Convertible Excavator



½-cu.yd. gasoline shovel

Several unusual features including a rotating gear as large as the over-all width of the crawlers, centralized machinery mounting, ball-bearing roller path and high ground clearance combined with unusual compactness feature the new type 120 ½-cu.yd. shovel, dragline, clamshell and crane recently announced by the Marion Steam Shovel Co., Marion, Ohio. This new model, designed for general small excavating and material-handling work, is built around a standard McCormick-Deering power unit equipped with anti-friction bearings which is mounted longitudinally above the rotating center of the machine. Dipper capacity is ½ cu.yd.; boom length, 18 ft. 6 in.; dipper handle length, 11 ft. 10 in.; dumping height, 12 ft. 7 in.; dumping radius, 22 ft.; working weight, about 42,000 lb.

◆

Crawler Dump Wagon Improved

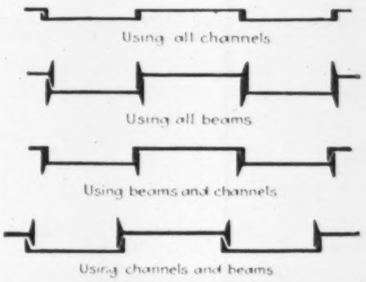
Many important improvements have been made in the all-steel 7-8 cu.yd. crawler-mounted dump wagon produced by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa. To permit short turns without interference with the tractor or preceding wagon, the heat-treated cast-steel tongue is now arched and provided with two connecting holes, one for direct hitch to the tractor, the other for use in attaching to a preceding wagon. The tongue is securely fastened to the 21-in. wagon deck by eight 1-in. bolts and also to the front wagon crossbar by three 1-in. bolts, giving a secure connection which, in case of replacement, can be changed very quickly. The rear frame crossmember and pullbar casting is secured by bolts in a similar fashion. Axle brackets have also been changed to secure a narrower tread, so that the wagon crawlers now follow directly behind the tractor crawlers.

A new dumping arrangement on the bottom of the doors utilizes a one-piece cable and an equalizing sheave so that both doors always pull up evenly. All wagons are equipped with a hand-winding mechanism fitted with roller bearings for easy operation. A hydraulic hoist can be supplied as well, either at the time of purchase or later. All hand-wind wagons are drilled so that a hydraulic jack can be bolted on the side at any time, and all hydraulic wagons are also supplied with a hand hoist for possible operation with tractors not equipped with a hydraulic pump. It is no longer necessary to pull a trip cable to release the dumping doors, as these are now held by the hydraulic hoist during the transporting period and are dumped by the tractor operator through the hydraulic control lever.

◆

Standard Structural Shapes Form Interlocking Steel Floor

A rugged, fireproof floor that can be detailed, fabricated and erected in conjunction with a building framework by the structural steel contractor has been designed by Joseph G. Shryock, chief engineer of the Belmont Iron Works, Philadelphia, Pa. Channels or I-beam, either standard or light weight, are closely laid to form the floor section, the adjacent flanges being joined by bolts, rivets or welds. Such a floor is easily designed, is adjustable both in length and in width to fit all panel sizes, will not warp or buckle, requires no trimming of plates, provides great strength and stiffness, can be formed with grooves for bonding or anchoring any type of finished flooring, contains ample space for piping and conduits embedded in the floor fill, gives a light dead load with great strength and provides a satisfactory footing for workmen of other trades following the steel erector. The high strength makes it possible to space the supporting beams farther apart than usual, resulting in a saving in the building framework cost. Suspended ceilings can easily be attached by hangers. It eliminates the necessity for concrete floor forms, reinforcing rods and wire mesh and provides a tight solid floor during construction.



Various forms of solid steel flooring

◆

Vibrating Screen Attachment for Bucket Loader

A new three-product vibrating screen for use with the Model 62 heavy-duty self-feeding bucket loader has just been introduced by the Barber-Greene Co., Aurora, Ill. The screen is designed for operation in gravel pits, in coke plants, on road jobs or in any place where bulk material must be classified by size. It will take gravel direct from the bank in a pit and load it out as oversize, gravel and plaster sand; or, when such a fine classification of gravel or coke is not

(Continued on page 596)

Bucket loader equipped with vibrating screen

Current Construction Unit Prices

51-In. Concrete Force Main, Little Falls, N. J.

A 51-IN. industrial service force main, reinforced-concrete type, is being constructed from the Little Falls (N. J.) pumping station, alongside an existing 51-in. steel main, to an eventual connection with an existing 48-in. steel pipe line. Specifications called for 20,575 ft. of either 54-in. lockbar or welded steel plate pipe, or cylinder reinforced-concrete pipe. Contract was awarded in August, 1931, to the Lock Joint Pipe Co., Ampere, N. J., for $369,466. The contract unit prices are given in the tabulation.

Excavation amounts to 44,000 cu.yd., of which the greater part is earth. The concrete items are for anchorages, valve vaults, manholes and culverts. Class A is 1 : 2½ : 5, and is used in the casing and backing of pipes in trench, and for other mass construction. Class B is 1 : 2 : 4, and is for valve vaults and manholes, and other thin sections. Class C is 1 : 2 : 4, and is for removable slabs for valve vaults and tunnels. The pipe totals 71 per cent of the total cost.

Contract was let by the Passaic Valley Water Commission, F. A. Barbour and W. E. Fuller, engineers.

51-IN. CONCRETE SEWER FROM LITTLE FALLS STATION, N. J.

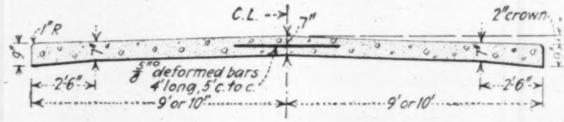
36,500 cu.yd. earth excav. to 8 ft. deep	[illegible]
5,000 cu.yd. earth excav. below 8 ft.	[illegible]
2,800 cu.yd. rock excav.	[illegible]
3,540 cu.yd. resurface penetrated hard pavement	[illegible]
400 cu.yd. class A concrete masonry	[illegible]
230 cu.yd. class B	[illegible]
40 cu.yd. class C	[illegible]
20,000 lb. steel reinforcement	[illegible]
20,575 lin.ft. 51-in. cylinder conc. pipe	12.75
200 ft. 6-in. cast-iron pipe	[illegible]
600 ft. 8-in. cast-iron pipe	[illegible]
50 ft. 12-in. cast-iron pipe	[illegible]
60 ft. railroad crossing	50.00
Gate Valves and Valve Boxes:	
Five 42-in.	1,600.00
Three 36-in.	1,200.00
Three 12-in.	120.00
Four 8-in.	[illegible]
Five 6-in.	65.00
One 4-in.	40.00
One 4-in. auto air and vacuum valve	125.00
Eight flush hydrants	75.00
Seven air vent sets	55.00
38,000 lb. manhole frames and covers	[illegible]
Venturi meter throat casting and steel plate cone tubes	3,100.00
One Venturi meter throat casting and steel plate cone tubes	3,100.00

Analysis of State Road and Bridge Contract Prices in Indiana in 1930

Roads One Course Concrete Pavement Characteristics	Width	Thickness	Total Miles	Total Sq. Yd.	Total Contract Price	Price per Mile Average	Price per Mile Range Low High	Per Sq. Yd Avg.	Per Sq. Yd Range Low High
Excavation Under 10,000 Cu.Yd. Per Mile									
Very small amount excav. and no drainage structs	18′	9″-7″-9″	3.637	38,435	$52,894	$14,543	$14,262-14,640	$1.37	$1.35-1.38
Avg. cost pavement materials	18′	9″-7″-9″	111.614	1,244,585	2,055,609	18,417	16,781-21,040	1.65	1.55-1.76
Small job	18′	9″-7″-9″	0.234	2,419	8,947	38,235	....	3.70	....
Low cost of pavement material	18′-30′	9″-7″-9″	4.026	61,143	88,636	22,016	....	1.45	....
Small job	18′-36′	9″-7″-9″	.814	14,205	28,461	34,964	....	2.00	....
Excavation 10,000 to 15,000 Cu.Yd. per Mile									
Avg. cost of pavement materials	18	9″-7″-9″	24.554	270,665	491,912	20,033	18,980-21,906	1.81	1.78-1.85
Higher cost of pavement materials	18′	9″-7″-9″	43.768	465,989	955,781	21,837	21,290-22,291	2.05	2.00-2.09
Avg. cost of pavement and extra item of resurfacing	18′	9″-7″-9″	4.040	40,931	101,848	25,210	....	2.49	....
Avg. cost of pave. mat'l and extra item of resurfacing	40′	9″-7″-9″	5.794	66,524	211,613	36,523	....	3.18	....
Excavation 15,000 to 30,000 Cu.Yd. per Mile									
Adv. cost of pav. mat'l. and extra item of resurfacing	20′	9′-7″-9″	3.066	23,413	81,134	26,462	....	3.47	....
Avg. cost of pavement materials	40′	9″-7″-9″	17.106	408,288	739,620	43,238	39,635-47,661	1.81	1.67-2.05
Avg. cost of pave. mat'l and very large amt. of excav.	40′	9″-7″-9″	1.083	15,860	37,261	34,590	....	2.35	....

Items	Unit	Awarded Bid Avg.	Awarded Bid Range	Lowest Bid Avg.	Lowest Bid Range
Excav. class A	Cu.Yd.	.40	.30 .60	.35	.30- .50
Excav. class B	Cu.Yd.	1.12	.85- 1.50	.60	.36- .80
Excav. class C	Cu.Yd.	1.21	.50- 2.00	.99	.43- 1.40
Excav. peat	Cu.Yd.	.18	.15- .25	.15	.15- .15
Special borrow	Cu.Yd.	.48	.30 - .60	.43	.30 - .60
Shoulders and side ditches	Lin.Ft.	.12	.08 - .25	.09	.04 - .15
Top soil for shoulders and slopes	Sq.Yd.	.12	.10 - .15	.09	.07 - .10
Conc. Cl. A-1:2:3½ mix, hd'walls	Cu.Yd.	17.99	12.00-24.00	15.42	10.00-20.00
Conc. Cl. A-1:2:3½ mix, culverts	Cu.Yd.	18.11	13.50-24.00	16.09	13.00-20.00
Conc. Cl. B-1:2½:4 mix, culverts	Cu.Yd.	17.84	12.00-22.00	15.21	6.00-18.00
Def. steel bars in struct's	Lb.	.045	.03 - .06	.039	.028- .05
Riprap	Sq.Yd.	2.00	1.50- 2.50	1.00	1.00- 1.00
Monuments	Each	5.87	3.00-10.00	3.03	1.50- 5.00
Catchbasins	Each	41.87	25.00-75.00	23.88	10.00-30.00
Catchbasins adjusted to grade	Each	30.00	....	30.00	....
Catchbasins with curb inlet	Each	49.00	20.00-85.00	24.00	20.00-30.00
Catchbasins—reset	Each	5.00	....	5.00	....
Manholes or catch basins covers adj	Each	11.00	5.00-20.00	4.80	4.00- 5.00
Farm drain tile 4″	Lin.Ft.	.10	....	.10	....
Farm drain tile 6″	Lin.Ft.	.28	.15- .40	.18	.15- .20
Farm drain tile 8″	Lin.Ft.	.27	.17- .40	.22	.17- .25
Farm drain tile 10″	Lin.Ft.	.25	.20- .30	.25	.20- .30
Farm drain tile 18″	Lin.Ft.	1.00	....	.50	....
Farm drain tile relaid 18″	Lin.Ft.	1.00	....	.30	....
Vit. clay pipe 6″	Lin.Ft.	.55	.50- .60	.50	.50- .50
Vit. clay pipe 8″	Lin.Ft.	.85	.30- 1.25	.47	.30- .70
Vit. clay pipe 10″	Lin.Ft.	.40	....	.40	....
Vit. clay pipe 12″	Lin.Ft.	1.38	.65- 2.00	.82	.65- 1.00
Vit. clay pipe 18″	Lin.Ft.	3.00	....	1.00	....
Vit. clay pipe, triple strength 12″	Lin.Ft.	1.75	....	1.35	....
Vit. clay pipe, triple strength 24″	Lin.Ft.	5.00	....	2.75	....
Reinf. conc. pipe 15″	Lin.Ft.	1.91	1.50- 2.40	1.52	1.00- 2.00
Reinf. conc. pipe 18″	Lin.-Ft.	2.35	1.50- 3.50	1.99	1.50- 2.50
Reinf. conc. pipe 24″	Lin.Ft.	3.09	1.50- 4.00	2.59	1.50- 3.00
Reinf. conc. pipe 30″	Lin.Ft.	3.37	2.50- 4.25	2.20	1.90- 2.50
Reinf. conc. pipe 36″	Lin.Ft.	8.00	....	5.00	....
Drop inlets—reset	Each	5.00	....	5.00	....
Combination curb and gutter	Lin.Ft.	.83	....	.70	....
Conc. paved side ditch	Lin.Ft.	.85	.50- 1.00	.66	.60- .80
Special paved side ditch	Lin.Ft.	1.00	....	1.00	....

Items	Unit	Awarded Bid Avg.	Awarded Bid Range	Lowest Bid Avg.	Lowest Bid Range
Remov. old conc. pav'mt	Sq.Yd.	.79	.30- 1.50	.48	.25- .75
Remov. old brick pav'mt	Sq.Yd.	.80	.50- 1.00	.46	.25- .75
One course conc. pave'mt 9″-7″-9″	Sq.Yd.	1.20	1.07- 1.42	1.18	1.00- 1.50
One course conc. pave'mt 9″-8″-9″	Sq.Yd.	1.37	....	1.37	....
Reinf. for conc. pave'mt	Lb.	.041	.03- .05	.032	.02- .05
3″ bitum. expan. joint	Lin.Ft.	.78	.20- 1.50	.52	.15- 1.00
1″ bit. expans. joint	Lin.Ft.	.44	.10- 1.00	.27	.10- .50
3″ bit. expans. joint	Each	12.00	10.00-15.00	6.84	1.20-10.00
1″ bit. expans. joint	Each	7.80	5.00-10.00	4.14	1.71- 5.00
Concrete resurfacing	Sq.Yd.	.90	.77- 1.00	.82	.70- 1.00
Test holes	Lin.Ft.	2.00	....	.25	....
Cement bags cleaned, per	1,000 bags	4.43	2.00-10.00	2.71	1.50- 5.00
Timber piling—furnished	Lin.Ft.	.25	....	.25	....
Timber piling—driven	Lin.Ft.	.75	....	.40	....
Reinf.conc.pipe,re'l'd 15″	Lin.Ft.	1.00	1.00- 1.00	.75	.50- 1.00



Cross-section of one-course concrete pavement of Indiana state highway

18 and 20 ft. wide, 9-7-9 in., 1:2:3 mix

Quantities and Weights of Materials in Pavement

ITEM	Per Lin.Ft. Amt.	Per Lin.Ft. Lb.	Per Sq.Yd. Amt.	Per Sq.Yd. Lb.
18 Ft. Wide				
Cement, bbl	.687	258	.344	129
Sand, cu. yd	.210	567	.105	284
Stone, cu. yd	.311	778	.156	390
20 Ft. Wide				
Cement, bbl	.761	286	.344	129
Sand, cu. yd	.233	629	.105	284
Stone, cu. yd	.345	863	.156	390

BAR REINFORCEMENT—Per lin.ft. Pavt.

¾ in. ϕ smooth bars	2.25 lin.ft. = 3.38 lb.
⅝ ϕ deformed bars	0.8 lin.ft. = 0.84 lb.

LONGITUDINAL JOINT PLATE

16 Ga. metal plate	7½ in.x1 in. = 1.594 lb.
⅜ in.x15 in. pins	0.38 lin.ft. = 142 lb.

Items	Unit	Awarded Bid Avg.	Awarded Bid Range	Lowest Bid Avg.	Lowest Bid Range
Reinf.conc.pipe,re'l'd 18"	Lin.Ft.	1.25	1.00– 1.50	.85	.70– 1.00
Reinf.conc.pipe,re'l'd 30"	Lin.Ft.	2.00		1.00	
Cast iron pipe 4"	Lin.Ft.	2.50		.50	
Galv. iron pipe 18"	Lin.Ft.	2.50		2.00	
Corr. metal pipe 12"	Lin.Ft.	1.00		1.00	
Corr. metal pipe 15"	Lin.Ft.	1.25		1.25	
Corr. metal pipe 18"	Lin.Ft.	1.67	1.60– 1.75	1.67	1.60– 1.75

Items	Unit	Awarded Bid Avg.	Awarded Bid Range	Lowest Bid Avg.	Lowest Bid Range
Corr. metal pipe 24"	Lin.Ft.	3.45	1.90– 5.00	2.20	1.90– 2.50
Flood gate for 24" pipe	Each	6.00		6.00	
Rel'd corr.metal pipe 30"	Lin.Ft.	3.00		1.00	
Side road pipe 15"	Lin.Ft.	1.79	1.50– 2.15	1.44	1.35– 1.50
Side road pipe 18"	Lin.Ft.	2.00	1.75– 2.00	1.78	1.60– 2.00
Side road pipe 24"	Lin.Ft.	2.55	2.10– 3.00	2.30	2.10– 2.50

Note:—The average figures are straight mathematical and not weighted.

BRIDGES

Type	No. of Bridges	Reinforcing Steel, Lb.	Structural Steel, Lb.	Masonry, Total Cu.Yd.	Masonry & Steel, Total Tons	Total Contract Price, Dollars	Total Cost of Bridges Per Cu.Yd. of Masonry Ave.	Per Cu.Yd. of Masonry Range	Per Ton of Masy. & Steel Ave.	Per Ton of Masy. & Steel Range
				No Timber Piling						
Steel truss	3	57,010	441,376	952	2,155	48,575	51.3	47.5–55.5	22.5	21.0–24.4
Reinf. conc. arch	7	413,734		5,239	10,685	135,161	25.8	24.2–31.1	12.7	11.8–15.2
Reinf. conc. girder	5	203,591		1,531	3,163	41,789	27.3	25.0–31.4	13.2	12.1–15.0
Extension to reinf. conc. girder	1	8,961		159	322	4,606	28.9		14.3	
Reinf. conc. girder & exten. to slab	2	19,577		219	449	7,265	33.1		16.2	
Reinf. conc. girder & steel girder	3	89,678	108,383	722	1,543	23,662	32.8		15.3	

NOTE:—This analysis does not include cost of removing present structures, erection of temporary bridges, or cost of approaches including drainage, and roadway paving for same.

Type	No. of Bridges	Reinforcing Steel, Lb.	Structural Steel, Lb.	Masonry, Total Cu.Yd.	Masonry & Steel, Total Tons	Total Contract Price, Dollars	Per Cu.Yd. of Masonry Ave.	Per Cu.Yd. of Masonry Range	Per Ton of Masy. & Steel Ave.	Per Ton of Masy. & Steel Range
				Including Timber Piling						
Steel truss	10	265,845	887,616	2,943	6,463	144,430	49.0	42.4–64.5	22.3	19.7–28.2
Steel girder	2	33,860	226,347	240	610	34,192	142.4		56.0	
Reinf. conc. girder & steel truss	2		51,924	432	890	16,863	39.0		18.9	
Reinf. conc. girder	7	274,574		2,674	5,486	88,833	33.2	29.8–40.5	16.2	14.5–19.8
Reinf. conc. girder*	1	12,730		146	298	6,997	47.9		23.4	
Reinf. concrete arch	5	310,517		3,884	7,844	127,777	33.2	31.9–37.5	16.3	15.6–18.5
Open spandrel & reinf. conc. arch	4	256,551		2,687	5,502	93,561	34.8	34.4–35.4	17.0	16.7–17.4
Reinf. conc. slab & reinf. conc. arch	2	21,086		438	887	15,966	36.4		18.0	
Reinf. conc. girder & reinf. conc. arch	5	109,169		1,742	3,539	59,925	34.4	34.4–34.5	16.9	16.7–17.0

*Higher cost per cu. yd. and ton due to relatively high price of some items.

Items	Unit	Awarded Bid Avg.	Awarded Bid Range	Lowest Bid Avg.	Lowest Bid Range
Excav.—class A	Cu. Yd.	.92	.40–2.50	.46	.20– .90
Excav.—class C	Cu. Yd.	1.50		1.00	
Excav.—class X	Cu. Yd.	4.10	1.00–6.00	2.17	1.00–4.00
Excav. dry	Cu. Yd.	.87	.40–2.00	.62	.20–1.00
Excav. wet	Cu. Yd.	3.23	1.50–4.00	2.54	1.00–4.00
Excav. dry for clearing waterway	Cu. Yd.	.71	.30–2.00	.46	.30–1.00
Excav. channel change	Cu. Yd.	.50	.50– .50	.43	.35– .50
Excav. special fill material	Cu. Yd.	.93	.50–1.50	.75	.50–1.25
Special borrow	Cu. Yd.	.72	.30–2.00	.50	.30– .91
Concrete Cl. D–1:2:3½ mix.	Cu. Yd.	18.53	13.30–22.50	18.09	13.30–22.00
Concrete Cl. E–1:2½:4 mix.	Cu. Yd.	15.57	12.00–19.00	14.66	11.00–18.43
Waterproofing	Sq. Yd.	.36	.15– .50	.25	.10– .35
Reinforcing steel	Lb.	.045	.03–.052	.043	.03– :05
Bit. expansion joints	Each	7.36	1.00–15.00	2.42	1.00–10.00

Items	Unit	Awarded Bid Avg.	Awarded Bid Range	Lowest Bid Avg.	Lowest Bid Range
Riprap	Cu. Yd.	6.00		2.00	
Handrail	Lin. Ft.	3.41	2.25–4.25	2.67	1.75–3.10
Structural steel	Lb.	.059	.05–.065	.056	.05–.08
Removing present pave.	Sq. Yd.	40		40	
Concrete pavement	Sq. Yd.	1.75	1.18–2.50	1.49	.50–2.50
Pavement reinforcing	Lb.	.042	.03– .05	.035	.03– .05
Metal surface	Sq. Yd.	.25		.25	
Timber piles driven	Lin. Ft.	.48	.20– .75	.31	.15– .65
Timber piles furnished	Lin. Ft.	.33	.25– .60	.28	.20– .60
Vitrified clay pipe 12 in.	Lin. Ft.	1.50		1.50	
Reinf. conc. pipe 15 in.	Lin. Ft.	2.35		2.35	

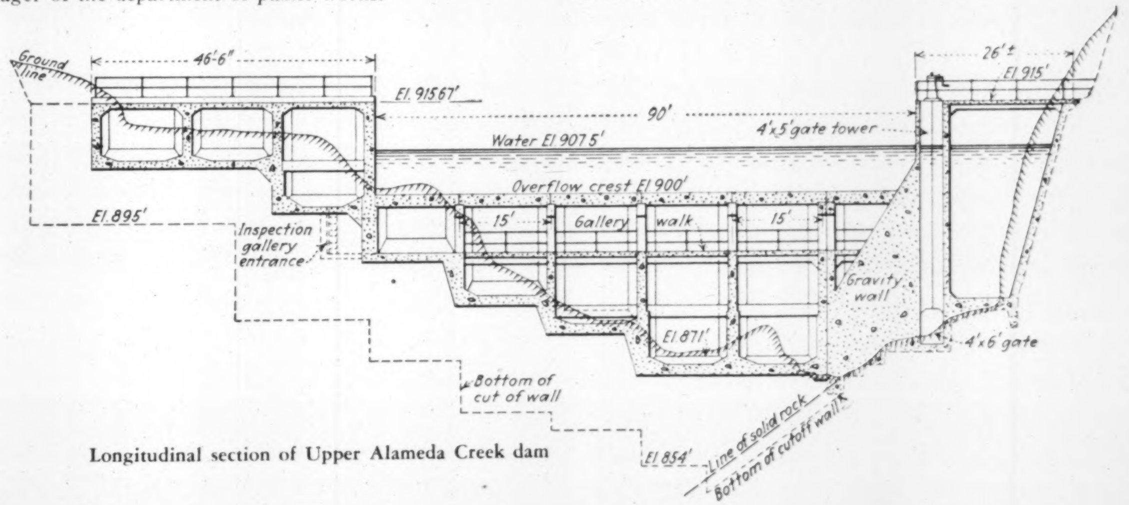
Upper Alameda Creek Dam for San Francisco Water

UPPER Alameda Creek diversion dam for the San Francisco water department will be constructed across Upper Alameda Creek to divert the flow from 30 square miles of watershed through a tunnel 9,700 ft. long. The tunnel empties into the Calaveras reservoir of the water department system.

The dam is a reinforced-concrete buttressed slab dam with a short gravity wall. Spillway crest is 30 ft. above the low point of the streambed. The dam is 160 ft. long, the overflow section 90 ft.

Contract unit prices are given herewith of Barrett & Hilp, 918 Harrison St., San Francisco. N. A. Eckart is general manager of the department of public works.

Clear and grub, per acre	$250.00
Excav. cutoff trenches in rock, cu.yd	3.30
Same in earth or gravel, cu.yd	2.50
Other rock excav., cu.yd	1.25
Other soft excav., cu.yd	1.10
Drill grout holes 0-30 ft., lin.ft	1.60
Grout holes more than 30 ft., lin.ft	3.00
Pressure grouting, cu.yd	1.00
Concrete per Cubic Yard:	
Upstream cutoff, class B	8.05
Found. mat, apron, class C	5.00
Buttresses, corbels, struts, footbridges, class B	12.00
Upstream slab, class A	14.35
Downstream slab, class B	11.75
Trash rack and tunnel portal, class B	11.50
Gravity walls and plain, class C	5.50
Sluiceway channel lining, class C	9.00
Backfill, 1:10 mix	5.00
Reinforcing steel in place, lb	0.038
Metal work in trash rack structure, lb	0.065
Galvanized iron rail, per ft	1.60
12-in. sluice gates, per lin.ft	2.00
Riprap	0.50



Longitudinal section of Upper Alameda Creek dam

Vibrating Screen Attachment for Bucket Loader

(*Continued from page 593*)

desired, the screen may be made into a two-product unit by removing one screen cloth.

The unit is made up of two screen cloths vibrated at 1,200 v.p.m. by an alloy steel eccentric shaft driven by a power takeoff direct from the main transmission of the loader. A belt that can be easily removed and rethreaded transmits the power to the screen. This belt is provided with an automatic takeup to compensate for stretch or contraction. The entire screen frame is vibrated in the center and cushioned on each end, and is counterbalanced so that no vibration is carried back to the loader frame.

Material discharged from the buckets of the loader falls first on a large mesh screen cloth which removes oversize, carrying it off over a steel chute. Shaken through the first screen, the material drops on a finer mesh below. The very finest size falls through this cloth onto a rubber belt conveyor, which carries it out and discharges it at a point 9 ft. from the center of the machine, while that which remains on the second screen passes off over a chute directly in back of the loader. In this way two trucks may be loaded at the same time. Screen cloths are provided in sizes to suit the individual user's need.

The screen is so mounted that it may be lowered to allow the loader boom to be rolled back for traveling, and raised to position again by a hand hoist. Either loader or screen may be operated independent of the other.

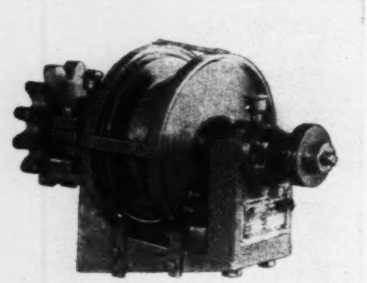
◆

STEEL SHEETPILING FOR STORAGE BINS

One of the new uses for steel sheetpiling recently developed by the Bethlehem Steel Co., Bethlehem, Pa., is the construction of bins or silos for the storage of such materials as crushed stone, gravel, sand and coal. Whether these are built in rectangular or circular form, assembly is very simple, as it is necessary simply to raise each successive unit high enough to engage the interlock and then drop it into position on a prepared base, usually of concrete. No intermediate hoops, bolts or rivets are required. The illustration shows a rectangular bin being used for the storage of crushed stone by the Union Paving Co., Philadelphia, Pa. One of the advantages of this type of storage is that the bin can readily be dismantled and moved to another location.

Power Dipper Tripping Device for Excavators

Increases in production of from 10 to 15 per cent are claimed for power excavators equipped with the Universal semi-automatic dipper trip manufactured by the Morin Mfg. Co., 896 Main St., Holyoke, Mass. This device consists of a continuously running shaft driven by one of the shovel gears, upon which is mounted two friction disks and a drum. The smaller disk, spring actuated, maintains a tight trip line, while the larger disk, which will exert a pull up to 400 lb., is used to trip the bucket latch. Control of the latter unit is through one of the regular operating levers, which is fitted with a hinged handle so that a simple twist of the operator's wrist is all that is necessary to dump the bucket.



Semi-automatic dipper trip

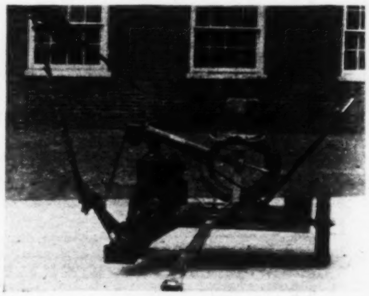
Not only does the automatic dipper trip conserve time and increase production but it also eliminates accidents, as it is no longer necessary to maintain a hair-trigger adjustment on the latch, as is customary with hand dumping. Models are carried in stock to fit all well-known makes of shovels. The device can be used not only with shovel buckets but also with skimmer scoops and pull shovels, or as a tag line in clamshell work.

◆

Separate Motor Drives Blade of Highway Mower

A highway shoulder mowing machine that will cut vegetation at a speed of from 8 to 20 m.p.h. and has a cruising speed of 50 m.p.h. over smooth surfaced roads when not mowing has been announced by the Rawls Mfg. Co., Streator, Ill. Although this machine is designed to be drawn by an automobile or a tractor, the cutter bar is driven independently by a gasoline engine mounted on the mower. Thus the speed at which the cutter bar operates is not dependent in any way upon the speed at which the machine is drawn. A throttle adjustment makes it possible to adjust the cutter-bar speed to suit varying conditions.

The new driving mechanism eliminates many gears, driveshafts, universal joints and other complicated parts that cause heavy maintenance expense and limit the speed of operation. Connection of the 3-hp. gasoline motor to the cutter bar is by means of a simple twin V-belt drive to a Pitman wheel. Cutter bars can be furnished in either 5 or 6 ft. lengths, and will cut at any angle from straight up to 45 deg. downward. This angle can be changed by the operator while the machine is in motion. An automatic spring trip allows the cutter bar to swing back alongside the frame when an obstruction is hit, thus eliminating breakage and dulling of the cutter bar and the delay which usually results from such an accident.



Motor-driven highway mower

The frame of the mower is of structural steel, reinforced and welded, and it is mounted upon wire wheels equipped with pneumatic tires.

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	*Project*	*Cost*	*Status*
Waterworks			
Los Angeles	Aqueduct, etc	$220,000,000	Bonds voted
Ft. Wayne (Ind.)	Filtration plant	1,000,000	Bids asked
Lincoln (Neb.)	Water mains, etc	1,309,000	Contract
Bridges			
Ohio	Bridges	4,107,800	Proposed
Dams			
McKeever (N. Y.)	Dam	4,000,000	Proposed
Texas	Dam	10,000,000	Proposed
Power and Lighting			
Ontario	Transmission lines	1,000,000	Contract
Federal Government			
Columbus (Ohio)	Federal building	2,275,000	Proposed
Factories and Mills			
Baypoint (Cal.)	Plant	1,000,000	Proposed
Texas	Refineries	1,000,000	Proposed
Houston (Tex.)	Refinery, etc	2,500,000	Proposed
Power Plants			
Detroit	Power plant add	1,000,000	Proposed
Warehouses			
New York	Warehouse	1,500,000	Proposed
Buildings			
Houston	Hospital	1,500,000	Proposed
Jamaica (N. Y.)	Armory	1,750,000	Proposed
Hershey (Pa.)	Vocational school	1,500,000	Proposed
Sioux City (Ia.)	Railroad station	1,000,000	Proposed
Houston	Railroad station	3,500,000	Bids asked

WATERWORKS

PROPOSED WORK

Calif., Los Angeles — City and other communities voted $220,000,000, to finance construction of Colorado River Aqueduct, 226 ft. long, steel and uncovered pipe, incl. terminal reservoir, in Cajalco Hills, diversion dam at Upper Parker Canyon, for Los Angeles Metropolitan Water Dist. F. E. Weymouth, ch. engr.

Calif., Santa Ana—Bd. Supervs. Orange Co., Waterworks Dist. 5, soon takes bids water distributing system, incl. 17,000 ft. 2, 4 and 6 in. diam. pipe, 100,000 gal. steel tank and tower, 350, to 400 gal. pumping plant, drilling well 400 ft. deep, 14 in. diam. Noted Sept. 24

N. J., Wayne—Bd. Freeholders Passaic Co., Court House, Paterson, installing new water works at Valley View County Grounds, incl. piping and pumping station. $50,000. **Maturity probably soon.** G. Ferguson, co. engr.

N. Y., McKeever—See "Dams."

Utah, Salt Lake City—City, Beaver Pond Reservoir, earth dam, 100 ft. high, impounding 2,700 acre ft. water. $400,000. H. Jessen, city engr.

Ont., Stratford—Council, waterworks and sewer extensions, and concrete paving Park Dr. $90,000. W. H. Riehl, city engr.

Ont., Welland—See "Sewers."

BIDS ASKED

Calif., Coalinga—Oct. 19, by E. J. McCroskey, city clk., 1,000 g.p.m. deep well turbine pump, against total of 165 ft. together with motor.

N. J., Paterson—Oct. 13, by Passaic Valley Water Comn., 156 Ellison St., furnishing, delivering four 72 in. electrically operated gate valves. F. A. Barbour and W. E. Fuller, engrs.

Ont., Kirkland Lake—Oct. 15, by J. W. McBain, clk. Teck Twp., motor driven centrifugal pumps and steel standpipe, 100 ft. high, 40 ft. diam. $7,500-$10,000. James, Proctor & Redfern, 36 Toronto, engrs.

Ont., Sarnia—See "Contracts Awarded."

Ont., Sudbury—See "Contracts Awarded."

CONTRACTS AWARDED

Neb., Lincoln—City Council, 132,600 ft. 36 in. c.i. pipe to Abel & Dobson Constr. Co., Lincoln, $1,309,000. Est. $1,600,000. Noted Sept. 17.

N. Y., Long Island City—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in 29th and 41st Sts., to Gregory Contg. Co., 351 East 124th St., New York, $9,688. Noted Sept. 17.

Utah, Salt Lake City—City Comn., 21,500 lin.ft. 24 and 30 in. concrete pipe for Mountain Dell Conduit, to F. Parrott, Salt Lake City, $92,824. Est. $108,500. Noted July 22.

Ont., Sarnia—Waterworks, incl. new 6 in. main in McKenzie St., day labor, under supervision H. H. Hall, supt. Waterworks. $35,000. Noted Sept. 24.

Ont., Sudbury—Extending water-mains, sewers, rock excav., grading, new sidewalks, day labor, during winter, under supervision W. McMullen, city engr. $150,000.

Ont., Wiarton—Town, constructing pump well and intake in connection with waterworks to Wm. Clark & Son, Owen Sound; c.i. pipes and fittings to National Iron Corp., foot of Cherry St., Toronto; pump, electric motor and pumping device, to Turbine Equipment Co., 73 King St., W., Toronto; gasoline engine and pump to Goldie & McCulloch, Galt. Est. $15,000.

SEWERS

PROPOSED WORK

N. J., Bernardsville—Boro Council, sewage system. $300,000. **Maturity in December or later.** Clyde Potts, 30 Church St., New York, engr. Noted July 9.

Tex., San Antonio—City, installing sludge drying plant at disposal plant. $200,000. Address P. Steppler, c/o City Hall, comr. Selecting engineer to make report on feasibility, etc.

Man., Winnipeg—City plans laying 2 trunk sewers, Ash St. from Haskins to Lennon Aves. and Jackson Ave. from Beaverbrook to Doncaster Sts. $270,000.

Ont., Stratford—See "Waterworks."

BIDS ASKED

Mich., Harbor Springs—City Clerk bids about Oct. 15, Harbor Point disposal plant to discharge into Little Traverse Bay, and trunk sewer with connections. $30,000. Pearse, Greeley & Hansen, 6 North Michigan Ave., Chicago, Ill., engrs.

N. J., Morris Plains—Oct. 9, by Dpt. Institutions & Agencies, State Office Bldg., Trenton, installing outside sewer, steam and water lines, electrical work for attendants buildings at New Jersey State Hospital, Greystone Park. $25,000.

N. Y., Brooklyn—Oct. 14, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Linden Blvd., 24th Ave., Cleveland and East 26th Sts.

O., Akron—Oct. 20, by E. A. Kemmler, dir. P. Serv., sanitary sewerage system and house laterals in Allenside Dist., Contr. 1, incl. 8,100 ft. 8- to 24-in. vitr. clay pipe, 150 cu. rein.-con., 400 ft. piling, $45,000; Contr. 2, incl. 6,280 ft. 8- to 21-in. vitr. clay pipe, 190 cu.yd. rein.-con., 400 ft. piling. $26,000. A. B. Backherms, Municipal Bldg., engr.

Utah, Salt Lake City—Opens bids Oct. 28, storm sewer along 4th, South Sts. Election Oct. 27, $360,000 bonds for same. H. Jessen, city engr. Noted Sept. 17.

Wash., Seattle—Bd. P. Wks. bids about Oct. 12, 7,800 ft. 43rd Ave. North Intercepting Sewer, 4th unit Lake Washington Intercepting Sewerage System. $100,000. E. F. Chase, Seattle, sanitary engr.

Wis., Milwaukee—Oct. 16, by Metropolitan Sewerage Comn., 8,609 ft. 30 x 39 in. special section concrete main sanitary sewer 9th St. right-of-way and Sunny Point Rd. $150,000. J. L. Ferebee, ch. engr.

Ont., Sebringville—Oct. 13, by D. M. Arbogast, Reeve Ellice Twp., 48,600 cu.yd. excav. and completion Whirl Creek Drain in Logan, Ellice and Fullarton Twps.

Ont., Sudbury—See "Waterworks."

Ont., Windsor—See "Contracts Awarded."

CONTRACTS AWARDED

Conn., Hamden (br. New Haven)—Town, pumping station, overflow basin, completion Spring Glen Project, to Chas. Smith & Sons, Inc., 101 Water St., Derby, $17,920. Est. $25,000.

N. J., Princeton—Mayor and City Council, sewage treatment plant, to Engstrom & Wynn, Inc., 1117 Chapline St., Wheeling, W. Va., $233,650; trunk sewer, to V. DiFrancesco, Lamerek, Pa., $118,247; sewer, to Cestone Bros., Montclair, $115,101; concrete pipe, to Lock Joint Pipe Co., Ampere, $54,725. Grand total, $521,723. Noted Sept. 3.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in East 53rd St., to P. Tomasetti, 1074 60th St., $57,652. Noted Sept. 10.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewer in Kenmore Pl., to R. Nazarro, Inc., 7101 11th Ave., $7,155; 4th Ave., to M. Fornara, 216 1st Ave., $3,157; in East 96th St., to E. Meluccio, 1209 61st St., $1,629. Grand total $11,942.

Tex., Port Lavaca—Texas Natural Gas Utilities, Petroleum Bldg., Houston, and Port Lavaca, sanitary sewerage system and sewage disposal plant, incl. 24,000 ft. 12- to 48-in. vitr. pipe, to Sanitary Appliance Co., 308 Hughes St., Houston, $40,000.

Wis., Milwaukee—Metropolitan Sewerage Comn., special section concrete main sewer, 2nd Sect. River Hills-Brown Deer Main Sewer to Wenzel & Henoch, 5025 State St., $117,092. Noted Sept. 18.

Ont., Windsor—Sewer extensions, grading, widening subway under Michigan Central tracks, constructing 2 concrete swimming pools, day labor, under supervision of R. J. Dasmarais, city engr. $300,000.

See proposal advertising on page 84

LEADITE

Trade Mark Registered U.S. Pat. Office

A 36-in. cast iron bell and spigot Force Main, jointed for permanency with LEADITE

"Leadership is usually the result of Merit"

It is known by many Leading Water Works men that, LEADITE is the oldest established, most frequently discussed and most widely used self-caulking material for jointing bell and spigot water mains. This fact has long been recognized throughout the water works field,—and the degree of "leadership" which LEADITE has attained is due to its EFFECTIVENESS, plus the MANY SAVINGS in time and money which its use assures.

In most every case, "LEADERSHIP" IS THE RESULT OF MERIT,—and this is true in practically every line of endeavor.

When LEADITE was first introduced, more than a Quarter of a Century ago, it had merit—and it has real merit today, which is proven by its ever growing popularity and widespread usage.

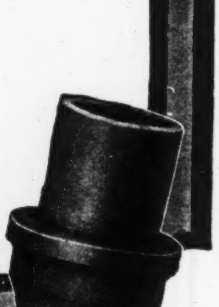
Thousands of miles of bell and spigot pipe are jointed for permanency and tightness with LEADITE.

The pioneer self-caulking material for c.i. pipe.
Tested and used for over 30 years.
Saves at least 75%.

THE LEADITE COMPANY
Land Title Building - - Philadelphia, Pa.

100 LBS.
LEADITE
REG. U.S. PAT. OFF.
CEMENT
for JOINTING WATER MAINS
MANUFACTURED BY
THE LEADITE COMPANY
PHILADELPHIA, PA.

No Caulking



WASTE DISPOSAL

PROPOSED WORK

N. Y., Douglaston—Dpt. Sanitation, Municipal Bldg., New York, incinerator, Northern Ave. $1,400,000. **Maturity in November or later.** Noted July 23.

N. Y., New York—Dpt. Sanitation, Municipal Bldg., incinerator, East 9th and 10th Sts. $950,000. **Maturity soon.** Noted July 16.

BIDS ASKED

N. Y., Brooklyn—Carlite Products Corp., 405 Lexington Ave., taking bids steel for incinerator and stack, Brightwater, Van Dam and Varick Sts. Total est. $150,000. Foundation piling awarded to Raymond Concrete Pile Co., 140 Cedar St., New York. Noted Sept. 24.

BRIDGES

PROPOSED WORK

California—State Hy. Comn., Sacramento, plans bridge over Paradise Cut between Tracy and Stockton, San Joaquin Co. $77,500. C. H. Purcell, hy. engr.

Calif., Los Angeles—Los Angeles Co., three 21 ft. span timber bridge with concrete deck, 20 ft. roadway over Rubio Wash at Ramona Blvd. W. D. Armstrong, Hall of Records Bldg., engr.

N. J., Atlantic City—Shore Fast Line, Terminal replacing wooden trestle with steel trestle, destroyed by fire. $150,000. **Maturity probably soon.** Private plans.

Ohio—Expending $4,107,800 building 280 bridges. State furnishes $3,126,050; Federal Government $823,750 and counties $158,000 toward cost. O. W. Merrell, Columbus, dir. hys.

Ont., Sudbury—Soon takes bids two 50 ft. concrete, rein.-con. bridges 1 on Elm St. other on Beech St. $25,825. W. McMullen, Mackie Bldg., engr. Noted Apr. 30.

BIDS ASKED

Calif., Los Banos—Oct. 21, by State Hy. Comn., Sacramento, 3 timber bridges, one consists five 19 ft. spans, one sixteen 19 ft. spans, other twelve 19 ft. spans. Merced Co., near here. C. H. Purcell, hy. engr.

Ia., Clarinda—Oct. 15, at office Auditor Page Co., two 90 x 16 ft. and one 90 x 18 ft. pony truss bridges, all with wood floors and creosoted pile abutments. Address Auditor or County Engineer, Clarinda.

N. Y., Buffalo—W. Rathman, comr. P. Wks., Municipal Bldg., bids about Oct. 22, bridge over Buffalo River at Michigan Ave. E. P. Lupfer Corp., Ellicott Sq., engr. Noted Oct. 1.

Pa., Pittsburgh—Bd. Supervs. Allegheny Co. taking bids Bridge 9 over Saw Mill Run, undergrade crossing on McNeilly Rd. and removing bridge over Saw Mill Run. $44,000. V. R. Covell, County Office Bldg., engr.

Pa., Pittsburgh—Oct. 13, by R. G. Woodside, controller Allegheny Co., Court House, paving superstructure and gunite protection Boston Bridge 9 over Youghiogheny River. $18,000. V. R. Covell, County Office Bldg., engr. Noted Apr. 16.

Pa., Pittsburgh—Oct. 13, by R. G. Woodside, controller Allegheny Co., Court House, paving superstructure and north approach to West End-North Side Bridge. $80,000. V. R. Covell, County Office Bldg., engr. Noted Aug. 13.

Wash., Seattle—Oct. 13, by Comrs. King Co., Court House, 5 span 220 ft. reinforced slab bridge on concrete piers, on Sylvester Rd., near 3-Tree Point. $20,800. T. D. Hunt, Seattle, co. engr.

CONTRACTS AWARDED

Idaho, Roberts—Commissioner P. Wks., Boise, 4 span 400 ft. steel bridge over Snake River, near here, to D. J. Cavanaugh, Twin Falls, $31,578. Est. $35,000. Noted Sept. 21 Daily.

New York—A. W. Brandt, comr. Hys., Albany, bridges in Delaware Co., to R. E. Tompkins, Rochester, $72,758; est. $101,235—Wayne Co., to H. J. Mack, Buffalo, $19,975; est. $23,845—Cattaragus Co., to J. B. Schultz, Buffalo, $42,307; est. $75,197—Cortland Co. and Tioga Counties, to Scott Bros., Constr. Co., 135 West Dominick St., Rome, $37,876 and $31,772 respectively; est. $53,262 and $45,830 respectively—Oswego Co., to T. Venezia, Syracuse, $31,009; est. $42,467—Erie Co., to P. DePerro Co., Buffalo, $43,285; est. $61,602—Warren and Saratoga Counties, to B. M. Stark, Saratoga Springs, $76,805; est. $97,920—Chenango, to Hub City Constr. Co., 435 South Salina St., Syracuse, $55,447; est. $72,772—Allegany Co., to G. W. Rice, Salamanca, $24,208; est., $36,480—Greene Co., to M. A. McCoy, Utica, $37,304; est., $52,632. Grand total, $472,746. Noted Aug. 20 and 27.

Texas—G. Gilchrist, state hy. engr., Austin, steel, concrete Abilene Southern R.R. overpass and Elm Creek bridge and road approaches, Runnels Co., to D. F. Jones Constr. Co., Little Rock, Ark., $63,548, est. $70,000—steel, concrete St. Louis, Southwestern and Missouri, Kansas & Texas R.R. overpass and Waco Creek Bridge McLennan Co., to J. F. Buckner, 407 North Main St., Cleburne, $37,215, est. $50,000—Frisco R.R. overpass, Brown Co., to J. B. Clardy Constr. Co., 1109 Park Ave., Fort Worth, $29,100, est. $40,000—Galveston, Harrisburg & San Antonio R.R. overpass, Kinney Co. and 2 rein.-con. deck girder span bridges, Val Verde Co., to F. Floyd Malcolm & Co., Abilene, $22,602, and $37,057, respectively, est. $25,000 and $30,000 respectively—5 steel, concrete, treated timber bridges, Leon Co., to E. Pettus, Montgomery, Ala., $76,199, est. $100,000—South Sulphur River bridge, Delta and Hopkins Counties to Womack Henning Constr. Co., Sherman, $36,914, est. $50,000—1 concrete deck girder span bridge and 1 steel I-beam stringer bridge, Pecos Co., to Dozier Constr. Co., Littlefield Bldg., Austin, $43,284, est. $50,000—North Llano River and Brick Hollow Bridges, Kimble Co., to McClung Constr. Co., Fort Worth Natl. Bank Bldg., Fort Worth, $59,419, est. $80,000—Guadalupe River Bridge, Victoria Co., and 3 rein.-con. deck girder span bridges, Colorado Co., to Russ Mitchell, Inc., 710 Petroleum Bldg., Houston, $45,138 and $27,252 respectively, est. $50,000 and $30,000 respectively—3 rein.-con. bridges, King Co., to Monarch Eng. Co., Box 962, San Antonio, $30,719, est. $30,000—rein.-con. bridge, Pecos Co., to Sanders & Hurlburt, Three Rivers, $23,654, est. $30,000. Grand total $532,101. G. Gilchrist, state hy. engr., Austin, withdrew bids 4 rein.-con. deck girder bridges, Kerr Co. $30,000. Noted Sept. 10, under "Streets and Roads."

Virginia—See "Streets and Roads."

Ont., Fort William—Council, concrete approaches to bascule bridge over Kaministiquia River, to Barnett McQueen Constr. Co., 207 Cuthbertson Blk., $65,000. Noted Sept. 24.

STREETS AND ROADS

BIDS ASKED

Ark., Mountain Home — See "Contracts Awarded."

Calif., Hollister—Bd. Supervs. San Benito Co. taking bids ¾ in. oil and rock armor coat surfacing 3.6 mi. Fairview Rd.

Calif., Martinez—See "Contracts Awarded."

Calif., Redwood City—Oct. 19, by E. B. Hinman, clk., San Mateo Co., 5,700 cu.yd. clearing, grading, 8,000 cu.yd. overhaul, Sneath Rd.

Calif., San Jose—Oct. 13, by H. Pfister, clk. Santa Clara Co., asphaltic concrete paving 117,000 sq.ft. Rosa and Burton Sts., et al.

Ia., Hampton—Bd. Supervs. Franklin Co. rejected bids grading, drainage structures 6.035 mi. trunk roads, 30 ft. C. D. Rudisill, Court House, engr.

Kansas—Oct. 13 by State Hy. Comn., Court House, Washington **(P. means Project, and K.P. Kansas Project)** sand gravel surfacing 6.2 mi. P. 508-29, K.P. 7481 Chase Co.—2 mi. P.36-18-A, K.P. 7482 Jewell Co.—7.8 mi. P.36-20, K.P. 7483—11.7 mi. P.81-24, K.P. 7484, both Republic Co.—13 mi. P-4-S-14, K.P. 7485 Ellsworth Co.—14.4 mi. P.9-18, K.P. 7486—14 mi. P.9-19, K.P. 7487, both Washington Co.—9.6 mi. P.4-9, K.P. 7488 McPherson Co. W. V. Buck, Topeka, hy. engr.

Kan., Augusta—R. M. Book, city clk., rejected bids Sept. 16, grading, drainage structures, guttering, manholes, catch basins, curbing, oil-bound macadam paving 17,163 sq.yd. Will readvertise in spring. J. R. Switzer, City Hall, engr.

Kan., Lawrence—Oct. 15, by C. O. Bowman, clk. Douglas Co., grading, drainage structures, curbing, guttering, sewers, bituminous or 6 in. rein.-con. paving 4,000 sq.yd. in West Hill, residental dist. of here. B. M. Babb, consult. engr.

Maryland—Oct. 13, by State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 0.15 mi. Contr. M-190-32.—0.2 mi. Contr. M-188-32—and 1 mi. Contr. M-187-34, all in Montgomery Co.—gravel surfacing 1.8 mi. Contr. Ch-109-82, Charles Co.—grading, drainage structures, superstructure for bridge 1.01 mil. Contr. A-108-64—concrete shoulders 3.71 mi. Contr. A-105-611, both Allegany Co. H. Williar, Jr., Federal Reserve Bank Bldg., Baltimore, engr.

Massachusetts—Oct. 13, by Dpt. P. Wks., State House, Boston, A. W. Dean, engr., broken stone and tar surfacing 2,600 ft. Salisbury—rein.-con. widening, bituminous macadam paving 2,061 ft. Ashby.

Mississippi—Oct. 13, by State Hy. Comn., Jackson, grading 2 mi. Mississippi Hy. 22, incl. 7,000 cu.yd. earth and 1,000 cu.yd. borrow excav. Covington Co.—170,071 cu.yd. hydraulic settlement of fills by pressure jetting Federal Aid Projects 117 and 210-A Lauderdale Co.—381,134 cu.yd. hydraulic settlement fills by pressure jetting Federal Aid Project 184-F, Warren Co., also furnishing f.o.b. Marks, four 33 in. and 125 lb. Bethlehem—beams 51 ft. 2 in. in length rolled with chamber of 1 in. to 1¼ and steel channel rails Plan with M-608 modified, also bearing plates, anchor bolts, washers, Plan M-545, Warren Co. C. M. Williamson, dir.

Nebraska—Oct. 16, by State Dpt. P. Wks., Lincoln, concrete paving 1.3 mi. road—sand-gravel surfacing 99 mi. road—3 bridges, culverts, patrol graveling 97.3 mi. road. R. L. Cochran, state hy. engr.

N. J., New Brunswick—Oct. 13, by Bd. Freeholders Middlesex Co., Court House, paving Bordentown Turnpike and Amboy Ave. W. F. Buchanan, co. engr.

N. Y., Brentwood—Commissioner Mental Hygiene, State Office Bldg., bids about Oct. 15, road at Pilgrim State Hospital. Former bids rejected. Noted Sept. 3.

N. Y., New York—Oct. 14, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, curbing, sidewalks on East 156th St. and Leland Ave.

Pa., Pittsburgh—See "Bridges."

Tex., Amarillo—Soon takes bids caliche with 2 course top surfacing 21st Ave. from Washington to Lipscomb Sts.; widening from 29 to 48 ft., 2½ in. brick on 4 in. concrete paving North Fillmore St. from 11th to 15th Aves. $25,000. E. N. Stanley, Amarillo, engr.

Tex., Austin—Oct. 15, by City, c/o A. R. Johnson, mgr., cold limestone, rock asphalt, duraco, amiesite, or warrenite bitulithic repaving 1,385 sq.yd. Cong. Ave. from 1st to 11th Sts. and 6th St. from E to W Aves. H. R. F. Helland, Austin, consult. engr. L. N. Chokla, Austin, paving engr.

Wash., Port Orchard—Oct. 19, by Comrs. Kitsap Co., grading, crushed rock surfacing 3.18 mi. Lateral Hy. 3, Brownsville to Keyport. $40,000. L. Berry, Port Orchard, engr.

Wisconsin—Oct. 13, by State Hy. Comn. and Hy. Coms. Outagamie and Oconto Counties, Nicolet Bldg., Green Bay, concrete paving 0.726 mi. Sherwood-Kaukauna Rd., S.T.H. 55, S.A.P. 3378, Outagamie Co.—Leightown Bridge, S.T.H. 22, S.A.P. 3458, Oconto Co.

Wis., Green Bay—Oct. 13, by Bd. Comrs. Calumet Co., concrete surfacing 9,250 sq.yd. Trunk Hy. 55. $25,000. O. F. Culbertson, Green Bay, engr.

Wyoming—Oct. 13, by State Hy. Comn., Capitol Bldg., Cheyenne, grading, bridging 13.811 mi. Baggs-Robbers Gulch Rd., F.A.P. 4-A and 210-A Carbon Co.; crushed graveling 18.45 mi. Casper-Salt Creek Rd., S.P. 912, Natrona Co.

Alta., Lethbridge—See "Contracts Awarded."

Ont., Ottawa—See "Contracts Awarded."

Ont., Toronto—See "Contracts Awarded."

CONTRACTS AWARDED

Ark., Mountain Home—Baxter Co., grading, drainage structures 7 mi. road between Mountain Home and Big Flat, force account. Noted Sept. 22.

Calif., Martinez—Contra Costa Co. rejected bids Sept. 21, grading 3.23 mi. Willow Pass Rd., incl. 12,112 tons macadam material, own forces. R. R. Arnold, Martinez, co. surv.

Calif., San Jose—Bd. Supervs. Santa Clara Co., grading, concrete paving Francisco Rd., to Union Paving Co., Call Bldg., San Francisco, $101,930.

Connecticut—J. A. Macdonald, state hy. comr., Hartford, loose gravel surfacing 21,845 ft. Willington, to Town of Willington—1,300 ft. Norwich, to Town of Norwich—rein.-con. paving 1,829 ft. Danbury, Ridgefield, Wilton, and Monroe, to Osborne-Barnes Co., Odd Fellows Bldg., Danbury—unrolled macadam paving 14,000 ft. Haddam, to F. E. Brookes, Higganum, waterbound macadam paving 14,230 ft. Woodbridge, to Clark Barone Co., 595 Legion Ave., New Haven—bituminous macadam paving 5,495 ft. Ansonia, to R. & B. Contractors, 283 John St., Bridgeport—gravel surfacing 6,912 ft. Montville, to J. F. Shea, West Cheshire—20,200 ft. Newtown to Barrett Bros., Stratford—18,555 ft. North Canaan, to Oneglia & Gervasini, 56 East Main St., Torrington—25,540 ft. Sharon, to Eabbri & Debarardino Co., Bantam. Est. exceeds $25,000. Noted Sept. 17.

Kentucky—State Hy. Dpt., Frankfort, grading, drainage structures, using first class rein.-con. pipe 2.704 mi. Lebanon Junction-Boston Rd., State Aid Project 46-DG and 7.828 mi. Belmont-Wooldridge Ferry Rd., State Aid Project 145-AG, both Bullitt Co., to Carter, Carter & Braden, Clay, $10,855 and $48,958 respectively—8.483 mi. Taylorsville-Mt. Washington Rd., State Aid Project 46-AG, Spencer Co., to Shields Constr. Co., Hazard, $81,105. Grand total $140,918. All bids rejected improving Lebanon-Raywick Rd., State Aid Project 210-AG Marion Co. H. D. Palmore, ch. engr. Noted Sept. 17.

Kentucky—State Hy. Dpt., Frankfort, grading, drainage structures 4 mi. Morehead-Flemingsburg Rd., Rowan Co., and 4 mi. same road, Fleming Co., to Phelps Constr. Co., Somerset, $33,000 and $50,000 respectively. Noted June 18.

Massachusetts—Dpt. P. Wks., A. W. Dean, State House, Boston, engr., bituminous macadam paving 4,581 ft. Forrest St., and 11,582 ft. Beach Rd., both in Salisbury to J. E. Watkins Co., Inc., 41 Powow St., Amesbury, $13,702 and $68,334 respectively—3,846 ft. Avon to Arute Bros., Inc., 513 South Main St., New Britain, Conn., $17,575—3,567 ft. Rowley to M. McDonough Co., Saugus, $17,073—gravel and tar paving 2,950 ft. Plainfield to N. Beocco & Sons, Goodrich St., Stockbridge, $17,631. Grand total $134,315. Noted Sept. 17.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., bitulithic paving Ramsdell Ave., etc. Wards 11 and 18 to F. Jacobs, Center St., West Roxbury. Est. $25,000.

Michigan—J. T. Sharpensteen, div. engr., Escanaba, grading, shaping, drainage structures, 2 course gravel surfacing 10,551 mi. F02-18 Contr. 1, Alger Co., 21 ft., to C. G. Bridges, Escanaba, $121,024 incl. cost of cement; 4,276 mi. M027-19C-2, Gogebic Co., 18 ft., to D. L. Norton, Ontonagon, $66,728, incl. cost of cement, for State Hy. Comn., Lansing. Noted Sept. 10.

Mich., Grand Rapids—Kent Co. Road Comn., 1500 Scribner Ave., grading, shaping, drainage structures, concrete paving 4.14 mi. West River Rd., to H. C. Nelson, Muskegon, $81,126. Noted Sept. 10.

Mississippi—State Hy. Comn., Jackson, settlements of fills in various Federal Aid roads, Projects 1, 40 and 215-A, to Lawrence Constr. Co., Jackson—Projects 55, 89-A, 209-A and 207-B, to Hartman-Clark Bros., 920 Peoria Life Insurance Bldg., Peoria, Ill.—Projects 70-C, 70-D, 73-D, 73-E, 200-C and 216-A, to Clark & McCaa, Jackson—Projects 162,200-B, 200-D, 200-E and 200-F, to Walker Constr. Co., Jackson.—improving sections Old Spanish Trail, U. S. Rd. 90, Hancock Co., to Nixon & Philips, 917 6th Ave. N., Birmingham, Ala., $6,500—

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Streets and Roads (Continued)

electric lighting equipment and installation on Biloxi Bay Bridge in Jackson and Harrison Counties, to S. C. Irby Co., Jackson, $5,210. Noted Sept. 3.

Mo., Clayton—St. Louis Co., grading, concrete paving 5 mi. Oliver St., 20 ft., to W. C. Meneley Co., Denny and Conway Rds., Clayton, Mo., and Terre Haute, Ind., $79,839.

Neb., Lincoln—Lancaster Co. paving Dist. 62, intersection A and Main Sts. in Roca, and channel excavation on east side Sect. 32-12-5, to Abel Constr. Co., Terminal Bldg., $16,171 and $1,400 respectively.

Neb., McCook—Concrete paving 5 blocks East 5th St., to McCook Cement & Stone Co., McCook, $35,154; mains in East 5th and East 6th Sts., to L. H. Chambers Co., 33224 Pershing Rd. E., $7,264.

N. J., Freehold—Monmouth Co., Court House, paving 4.13 mi. 1st Sect. Route 36, to S. S. Thompson & Co., Inc., Red Bank, $235,381; Asbury Ave., to Grant Constr. Co., 7 East 42nd St., New York, $74,837. Noted Sept. 10.

N. J., Paterson—Passaic Co., Court House, sheet asphalt and bituminous paving Union Ave., to Franklin Constr. Co., 349 Highland Ave., Passaic, $61,544.

N. J., Trenton—Bd. Freeholders Mercer Co., Trenton, concrete paving 1st Sect. North Olden Ave., to P. DeAntonio, 224 East Hanover St., Trenton, $40,170. Noted Sept. 24.

New York—A. W. Brandt, comr. Hys., Albany, concrete and bituninous macadam paving 11.3 mi. Dutchess and Putnam Counties, to M. A. Gammino Constr. Co., 25 Hartford Ave., Providence, R. I., $659,067; est. $935,418—4.19 mi. Cayuga Co., to F. Callahan, Auburn, $107,743; est. $143,669—concrete repaving 2.76 mi. Tiogo Co., to Bolton, Suits, Bolton & Gibbs, Watkins Glen, $113,032 est. $149,638—8.84 mi. Wyoming Co., to Rochester Concrete Constr. Co., Inc., 466 Clinton Ave. S, Rochester, $405,787; est. $572,702—0.16 mi. Niagara Co., to Cofali-Hall Constr. Co., Inc., South Wales, $59,377; est. $94,701—6.11 mi. Cayuga Co., to Madison County Constr. Co., Inc., Solzville, $177,624; est., $239,074—1.3 mi. Onondago Co. and 1.73 mi. Yates Co., to Tyler & Cole, Meshoppen, Pa., $42,947 and $66,789 respectively; est. $54,108 and $92,094 respectively—6.33 mi. Rockland Co., to S. J. Groves & Sons Co., Inc., Ridgefield, N. J., $453,257; est. $662,549—11.4 mi. Franklin Co., to Spellman-Oliver Co., Chateaugay, $338,888; est. $520,047—6 mi. Washington Co., to D. Lewis Constr. Co., Inc., 1734 Van Vranken Ave., Schenectady, $205,168; est. $282,161—1.33 mi. Rensselaer Co., to Collins Bros., Mechanicville, $111,090; est. $147,124—0.43 mi. Dutchess Co., to A. E. Lucas & Co., 155 South William St., Newburgh, $26,601; est. $37,788—constructing 0.4 mi. Grand Central Parkway, incl. grade separation, Queens Co., to Johnson, Drake & Piper, Inc., 1st Natl. Bank Bldg., Freeport, $122,649; est. $146,815—Southern State Parkway, Nassau Co., to Tully & Di Napoli, Inc., 30-11 Sherman St., Long Island City, $54,326; est. $79,273—grading 1.1 mi. Rockland Co., to Waterbury Concrete Co., Tuxedo Park, $79,640; est. $114,183—7.87 mi. Monroe Co., to M. E. Colle, Inc., Le Roy, $52,054; est. $89,976—1.99 mi. Westchester Co., to L. D'Angell, Binghamton, $363,607; est. $509,249—slope protection 3.32 mi. Nassau Co., to Good Roads Eng. & Contg. Co., 250 Fulton St., Hempstead, $25,202; est. $36,742. Grand total, $3,164,848. Noted Aug. 20 and 27.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, asphalt paving Bway., to Meehan Paving Co., 90 West St., New York, $82,727—St. Felix St., to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., $7,545—granite block paving Metropolitan Ave., to Leonard Paving Co., 233 Bway., New York, $46,323. Grand total, $136,605. Noted Sept. 17.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, grading, granite block paving Mill St., to Columbia Eng. Co., 401 Bway., New York, $24,707. Noted Sept. 3.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., asphalt paving Valentine Ave., to Venetian Contg. Co., East Bay Ave. and Tiffany St., $22,764—Bussing Ave. and Fuller St., to Bronx Asphalt Co., Zerega Ave. and Westchester Creek, $3,153 and $5,476 respectively—Chestnut St., to Mascali, 645 East Tremont Ave., $2,713—St. Ouen St. and Morrison Ave., to Dedona Contg. Co., 1067 Olmstead Ave., $6,765 and $11,194, respectively—West Mosholu Parkway, to A. Musumecci, $7,727—curbing Boyd Ave., to F. Tosti, 2324 Cambreling Ave., $7,308; sewers in Cruger Ave., to Paulding Ave., Contg. Co., $6,463. Grand total, $74,063. Noted Sept. 17.

Texas—G. Gilchrist, state hy. engr., Austin, grading, small drainage structures 17.127 mi. hy. Presidio Co., to Trinity Farm Gravel Co., Box 1428, Dallas, $110,877 est. $156,000—15.152 mi. Brazos Co., and 9.867 mi. Tyler Co., to Valley Dredging Co., Donna, $126,989 and $33,769 respectively, est. $160,000 and $36,000 respectively—6.378 mi. Val Verde Co., to W. S. Thompson Constr. Co., San Angelo, $104,473 est. $160,000—3.564 mi. Wood and Upshur Counties, to G. E. Lucas, Sacul, $32,827 est. $56,000—5.622 mi. Van Zandt Co., to J. S. Moore & Son, Lufkin, $25,813 est. $32,000—13.719 mi. Pecos Co., to Hannah Constr. Co., and F. and D. Hall, Waco, $34,313 est. $86,000—13.569 mi. Colorado Co., to Standifer Bros., Big Wells, $34,484 est. $48,000—12.892 mi. Lubbock Co., to D. W. Eads, Fort Worth, $16,252 est. $25,000—2.511 mi. Hunt Co., to D. H. Purvis & Son, Box 706, Fort Worth, $17,854 est. $26,000—8.323 mi. San Jacinto Co., to J. C. Kelly Co., Trinity, $43,965 est. $56,000—grading, drainage structures, concrete paving 5.679 mi. Tarrant Co., to J. W. Zempter Constr. Co., 717 Fisk Bldg., Amarillo, $216,265 est. $300,000, all foregoing 26 ft. wide—grading, drainage structures, concrete paving 8.393 mi. Matagorda Co., to F. P. McElwrath Constr. Co., Corsicana, $158,875 est. $180,000—12.45 mi. Matagorda Co., to Highway Constr. Co., Daniels Bldg., Tulsa, Okla., $219,010 est. $280,000—grading, drainage structures 1.02 mi. and gravel or broken stone surface course with bituminous surface treating 10.733 mi. Bell and Williamson Counties, to Thomas & Ratliff, Rogers, $81,310 est. $120,000—concrete paving 13.834 mi. Brazoria Co., and 13.706 mi. Refugio Co., to H. P. Downey Constr. Co., Hammond, Ind., $207,687 and $208,177 respectively, est. $260,000 each—8.036 mi. Navarro Co., to Arcola Constr. Co., Niles Center, Ill., $121,541 est. $180,000—7.8 mi. Walker Co., to Russ Mitchell, Inc., 710 Petroleum Bldg., Houston, $121,463 est. $146,000—double bituminous on gravel base course surfacing 19.61 mi. Fisher and Nolan Counties to Morgan Constr. Co., Dallas, $123,227 est. $194,000—gravel surfacing 11.129 mi. San Jacinto Co., to R. B. Sparks, 225 North Brighton St., Dallas, $20,035 est. $40,000—gravel base course surfacing 5.565 mi. Hall Co., to E. Lloyd, Fort Worth, $21,774 est. $60,000—asphalt surface treating 10.514 mi. and triple asphalt surface treating 10.321 mi. hys., Cherokee Co., to Interstate Constr. Co., Box 143, Fort Smith, Ark., $29,438 and $31,471 respectively est. $44,000 and $42,000 respectively—7.052 mi. Harrison Co. to Lone Star Constr. Co., 1735 Milam St., San Antonio, $22,707 est. $32,000—triple asphalt on iron ore gravel base course surface treating 8.458 mi. Henderson Co., to McClung Constr. Co., Fort Worth Natl. Bank Bldg., Fort Worth, $57,577 est. $160,000—triple asphalt on caliche base course surface treating 2.241 mi. Dallas Co., and reconditioning old road, salvaging existing base and placing iron ore gravel base course and crushed iron ore gravel surface course on 9.353 mi. Rains Co., to Brown & Root, Inc., Colorado St., Austin, $20,462 and $62,430 respectively, est. $30,000 and $100,000 respectively—bituminous macadam on caliche base course surface course and reconstructed base course surfacing 8.816 mi. Dallas Co., to Uvalde Constr. Co., 920 Santa Fe Bldg., Dallas, $68,551 est. $88,000, all foregoing 18 ft. wide. Grand total $2,373,615. G. Gilchrist, hy. engr., Austin, cancelled bids grading, drainage structures, concrete paving 12.709 mi. hy. Bell Co., 18 ft. $260,000; withdrew bids grading, small drainage structures, 7.234 mi. Kerr Co., 26 ft. $50,000. Noted Sept. 10.

Virginia—State Hy. Comn., Richmond, clearing, grubbing, grading, drainage structures 1.29 mi. Route 22, Project S-479-F Craig Co., to J. A. Archer & Son, Ivanhoe, $15,302—clearing, grubbing, grading, drainage structures, concrete surfacing 30,281 sq.yd. Project S-562-C Nansemond Co., to R. G. Lassiter & Co., Raleigh, N. C., $65,607—three 35 ft. spans rein.-con. bridge over Davids Creek near Caskie, Route 13, Project F-658-B5 Appamattox Co., to W. C. Harvey, Lynchburg, $5,733—one 50 ft., one 55 ft. and one 47 ft. beam bridges, 1 over Carvins Creek, 2 over Tinkers Creek, near Troutville, Route 33, Project F-640-B Botetourt, and Roanoke Counties, to Alley Constr. Co., Bristol, $8,557. Grand total $95,199. Noted Sept. 17.

Wisconsin—State Hy. Comn. and Hy. Comr. Bayfield and Oneida Counties, Rhinelander, grading 2.18 mi. Langlade Co. Line-Pelican Rd., Oneida Co., to C. G. Bridges, Escanaba, Mich., $25,617; Drummond Relocation, Bayfield Co., to H. S. Kaliher, Washburn, $11,569.

Alta., Lethbridge—Concrete curbing, guttering, sidewalks, day labor under supervision. J. Haines, city engr. $75,000.

Ont., Ottawa—Grading, asphalt on concrete paving Parent Ave. from Water to Clarence Sts., day labor. $27,000. F. C. Askwith, City Hall, engr.

Ont., Toronto—Grading, sodding St. Clair Ave. reservoir and grading land south of Prince Edward Viaduct, day labor. $42,000. R. C. Harris, City Hall, engr.

Ont., Toronto—Bitulithic paving Keating St., Contr. A, to Kinghorn Constr. Co., 36 Toronto St., $54,978—Contrs. B and C, to Warren Bituminous Paving Co., 74 University Ave., $85,031 and $72,915 respectively. Grand total $212,924.

Ont., Windsor—See "Sewers."

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EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Ariz., Florence—Randolph Irrigation Dist. irrigation works for irrigation 9,600 acres, incl. 34 pumping plants, wells, 132,000 lin.ft. gunite lined ditches, laterals, 76 turnout structures, 35 culverts. $624,000 bonds voted.

Texas—See "Dams."

Texas—Tex-Mex Land Co., 207½ East San Antonio St., El Paso, dam across Rio Grande River in eastern part Brewster Co., to irrigate several hundred acres land between Del Rio and Laredo. $10,000,000. Private plans.

Tex., Orange—Orange Co. Reclamaton & Conservation Dist., c/o D. C. Bennett, judge, Orange reclamation project. $565,000 bond election in January for same. Address District Bd.

BIDS ASKED

Ala., Birmingham—Oct. 15, by A. J. Hawkins, city engr., widening, straightening, deepening Sect. 3, Valley Creek, from 7th St. S.W. to 7th St., $84,700; Sect. 10, Village Creek from 80th St. to 87th St., $19,100.

Miss., Round Lake—Oct. 14, 40,600 cu.yd. levee work on east bank Mississippi River, Sect. 2, below Bolivar Co. Line, 2 mi. north of here.

Bond Elections

Coming Bond Elections

Waterworks — Everton, Mo., $20,000. J. D. Alexander, Springfield, engr.

Water System — Pryor Creek (P. O. Pryor), Okla., Oct. 8, $25,000.

Sewer Ext. — Lansing, Mich., Nov. 3, $500,000.

Sewers—Bedford, O., Nov. 3, $175,000.

Storm Sewers—Canton, O., Nov. 3, $283,000.

Sewage Disposal Plant—East Palestine, O., Nov. 3, $30,000.

Storm and Sanitary Sewer Ext. — Salt Lake City, Utah, Oct. 27, $600,000.

Reclamation Project — Orange, Tex., Orange County Reclamation & Conservation Dist., c/o D. C. Bennett, Judge, January, $565,000.

Park Impvts.—Canton, O., Nov. 3, $25,000.

Light and Power Plant—Fairfield, Ia., Oct. 13.

Electric Light Plant — Pryor Creek (P. O. Pryor), Oct. 8, $75,000.

High School—Willow Glen, Calif., $150,000.

Schools—Scarsdale, N. Y., Union Free Dist. No. 1, Westchester Co., Oct. 26, $1,145,000.

Bonds Voted

Aqueduct, etc.—Los Angeles, Calif., Metropolitan Water Dist., $220,000,000.

Filter Plant, Reservoir, etc. — Maysville, Mo., $50,000. W. B. Rollins & Co., Kansas City, engr.

Water System—West Muncie, W. Va., $15,000.

Sewer System—Wegaunee, Mich., $60,000.

Irrigation Work — Florence, Ariz., Randolph Irr. Dist. $624,000.

Bonds Defeated

Water Distribution System — Urbandale, Ia., $20,000.

Sewer Ext.—Minden, La., $70,000.

High School and Jr. College — Santa Monica, Calif., $810,00.

FEDERAL GOVERNMENT

PROPOSED WORK

Ala., Montgomery—QUARTERS—Con. Q.M. soon takes bids rein.-con., brick officers' quarters, Maxwell Field. $300,000.

Ala., Montgomery—PAVING—Con. Q. M. soon takes bids paving apron and grading land, field and technical building area, Maxwell Field. $124,000.

Conn., Thomaston—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 story, basement, brick, steel post office. $80,000.

Ill., Grafton—DAM—U. S. Eng., 428 Custom House, St. Louis, Mo. core drillings being made near here for low dam on Mississippi River. Preliminary borings under way.

Ia., Council Bluffs — REMODELING, etc. — Treas. Dpt. at office Sup. Archt., bids early 1932, remodeling and constructing addition to U. S. Federal Building. $160,000.

La., Alexandria—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., plans by E. F. Nield, Shreveport, 3 story, basement, brick, stone, rein-con. post office and court house. $275,000.

Mo., Springfield—RADIO STATION—Dept. Commerce, soon takes bids radio station, near Springfield Municipal Airport. $60,000.

N. J., Jersey City—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by William Neumann & Son, Journal Sq., U. S. Post Office, Washington and Montgomery Sts. $400,000.

O., Columbus—FEDERAL BUILDING—Treas. Dpt. at office Sup. Archt., U. S. Federal Building. $2,275,000.

Pa., Altoona—POST OFFICE—Treas. Dpt. at office Sup. Archt., soon takes bids 2 story, basement, mezzanine, 100 x 170 ft. post office, 12th St. and 11th Ave. $425,000. Royer & Anglesmeyer, Commerce Bldg., archts. Noted Sept. 3.

Texas—DREDGING—U. S. Eng., Galveston, 1,000,000 cu.yd. from channel between Galveston and Texas City.

Tex., Cisco—POST OFFICE—Treas. Dpt. at office Superv. Archt., brick rein.-con., plain found. $130,000-$150,000.

Vt., Beecher Falls—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Vt., Derby Line—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Vt., West Berkshire—STATION—Treas. Dpt. at office Sup. Archt., border station.

Wis., Olma—LOCK—U. S. Eng., St. Paul, Minn., constructing Lock 4, in Mississippi River, near here.

Wyo., Sheridan—HOSPITAL—Vet. Bu., Arlington Bldg., sketches U. S. Veterans Hospital.

BIDS ASKED

California—BRIDGE—Oct. 20, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, Stoneman and El Capitan Bridges, grading approaches Sect. B2, Route 1, El Portal Floor of Valley Hy., Yosemite Natl. Park, Merced Co. To exceed $25,000.

Federal Government (Continued)

California—ROAD—Oct. 20, by C. H. Sweetser dist. engr. Pub. Rds., 461 Market St., San Francisco, grading, structures Sect. B., Route 12, Howard Gulch Natl. Forest Hy., Modoc Co.

Calif., Berkeley—REMODELING, etc.—Nov. 6, by Treas. Dpt. at office Sup. Archt., remodeling, extending (except elevator) U. S. Post Office; adv. EN-R Oct. 8.

Calif., Sunnyvale—GASOLINE TANK, etc.—Oct. 21, by 12th Naval Dist. Headquarters, 100 Harrison St., San Francisco, 1,000 gal. gasoline tank, incl. pump; 50 ft. steel water tower for existing tank; reconditioning and resetting motor and water pump on site; constructing water supply, plumbing electrical systems.

D. C., Wash.—GUY WIRE—Oct. 15, by A. L. Flint, genl. purch. ag. Panama Canal, guy wire, seizing wire, electric shearing machine, cable clips, shackles, turnbuckles, eye bolts, water gages, gage glasses, Schedule 2688.

Ind., Auburn—POST OFFICE—Oct. 27, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. EN-R Oct. 8. Noted July 16.

Kan., Emporia—REMODELING—Oct. 26, by Treas. Dpt. at office Sup. Archt., remodeling, enlarging U. S. Post Office; adv. EN-R Oct. 8.

Md., Fort Meade—QUARTERS—Oct. 13, by Con. Q.M., 12 sets officers' quarters and 8 sets non-commissioned officers' quarters.

Mass., Gloucester—BREAKWATER—Oct. 16, by U. S. Eng., Custom House, Boston, repairing breakwater, incl. 480 tons stone, 1,200 tons rubblestone, resetting 600 tons stone, 30 short tons pins. To exceed $25,000. Former bids rejected; adv. EN-R Oct. 8. Noted Sept. 3.

Mississippi—EARTHWORK—Oct. 14, by U. S. Eng., P. O. Box 667, Vicksburg, 40,600 cu.yd. earthwork on east bank Mississippi River.

Mo., Mountain Grove—POST OFFICE—Oct. 19, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. Noted Oct. 1.

Neb., Winnebago—HOSPITAL—Oct. 21, by Commissioner Indian Affairs, 2 story, basement, 43 x 220 ft. limestone, steel hospital. $128,500 appropriated.

N. Y., Brooklyn—CABLE—Oct. 20, by Signal Supply Office, Army Base, 58th St. and 1st Ave., cable.

N. Y., Brooklyn—REEL CART—Oct. 30, by Signal Supply Officer, Army Base, 58th St. and 1st Ave., reel cart.

N. Y., New York—DREDGING—Oct. 30, by U. S. Eng., Army Bldg., 39 Whitehall St., 1,171,900 cu.yd. in Anchorage Channel, Upper Bay, New York Harbor; adv. EN-R Oct. 8. Noted Sept. 10.

N. C., Greensboro—POST OFFICE, etc.—Oct. 29, by Treas. Dpt. at office Sup. Archt., U. S. Post Office Court House; adv. EN-R Oct. 8. Noted Feb. 10.

Okla., El Reno—REFORMATORY—Nov. 5, by Bu. Federal Prisons, S. Bates, supt., 2 story, basement, 161 x 185 ft. rein.-con., brick, stone, terra cotta mess hall $225,000, 2 story, basement, 50x200 ft. administration building $120,000, 2 story, basement receiving building $160,000. Hawk & Parr, 1019 Hales Bldg., Oklahoma City, archts. Noted Aug. 19.

S. D., Winner—POST OFFICE—Oct. 26, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. EN-R Oct. 8.

Va., Langley Field—SCREENING—Oct. 28, by Con. Q.M., screening 18 double company officers' quarters.

CONTRACTS AWARDED

Ark., Hot Springs—HOSPITAL—Con. Q.M., fond, grading demolition, plumbing work, etc., for hospital, to Bellows-Maclay Constr. Co., Construction Bldg., Dallas, Tex., $74,220. Noted Aug. 20.

California—ROADS—C. H. Sweetser, dist. engr. Pub. Rd., 461 Market St., San Francisco, grading 19,191 mi. Idyllwild Desert Natl. Forest Hy., Riverside Co., to Yglesias Bros., 1810 South 32nd St., San Diego, $240,916. Noted July 23.

Calif., Sunnyvale — HANGAR—Spec. 6631—Yards & Docks, Navy Dpt., hangar at Naval Air Station, structural steel work, main doors, door operating machinery, to Wallace Bridge & Structural Steel Co., West Marginal and Idaho Sts., Seattle, Wash., $1,116,044; roofing, siding, etc., to Siems-Helmers, Inc., 1014 Guardian Bldg., St. Paul, Minn., $398,937. Noted Aug. 20.

Conn., Hartford—ELEVATOR PLANT—Treas. Dpt. at office Sup. Archt., elevator plant in U. S. Post Office and Court House, to Otis Elevator Co., 810 18th St., Wash., D. C., $52,574. Noted Sept. 3.

Idaho, Boise—HOSPITAL—Vet. Bu. Arlington Bldg., infirmary building and connecting corridor at U. S. Veterans Hospital, to Morley Constr. Co., 1643 Bellview Ave., Kansas City, Mo., $229,000. Est. $250,000. Noted Sept. 3.

Mass., Chelsea—PASSENGER ELEVATOR—Yards & Docks, Navy Dpt., passenger elevator to Otis Elevator Co., 810 18th St., Washington, D. C., $6,302. Noted Oct. 1.

Michigan—DREDGING—U. S. Eng., Detroit, dredging Round Island Shoal, St. Mary's River, to Great Lakes Dredge & Dock Co., 104 South Michigan Blvd., Chicago, Ill., $231,280. Noted Aug. 20.

Mo., Cape Girardeau—BANK PROTECTION—U. S. Eng., Memphis, Tenn., joint levee setback and revetment work in Little River Drainage Dist. about 7 mi southesast of here, to Forcum-Jones Co., Dyersburg, Tenn., $60,000. Noted Sept. 18.

Neb., Lincoln — HOSPITAL — Vet. Bu., Arlington Bldg., 1 story, basement, brick, steel, rein.-con. recreation building addition officers quarters, at U. S. Veterans Hospital, to R. O. Stake, 145 South 28th St., $94,850. Noted Aug. 20.

N. H., Portsmouth—GENERATOR — Spec. 6544—Yards & Docks, Navy Dpt., turbo-generator, to Moore Steam Turbine Corp., Wellsville, N. Y., $22,810. Noted July 30.

N. J., Salem—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to General Eng. Co., Upper Darby, Pa., $55,000. Noted Sept. 3.

North Carolina—DREDGING—U. S. Eng., Norfolk, Va., 394,046 cu.yd. in Inland Waterway between Currituck Sound and Albermarle Sound, to Lukens Dredging & Contr. Corp., Snow Bldg., Baltimore, Md., $32,705. Noted Sept. 3.

N. C., Mount Olive—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to General Eng. Co., Upper Darby, Pa., $34,000. Noted Aug. 20

R. I., Melville—LEAD LINING—Spec. 6641—Yards & Docks, Navy Dpt., lead lining for tank, to M. McNamara, 180 Linden St., Everett, Mass., $2,485.

R. I., Pawtucket—ELEVATOR, etc.—Treas. Dpt. at office Sup. Archt., freight elevator and dumbwaiter in U. S. Post Office, to Portland Elevator Co., 133 Oliver St., Boston, Mass., $3,500. Noted Aug. 27.

Oregon—ROAD—Bureau P. Rds., Post Office Bldg., Portland, grading 7.8 mi. Diamond Lake Rd., Crater Lake Natl. Park to A. E. Guthrie, Sherlock Bldg., Portland, $45,666.

Tenn., Memphis—PONTOONS—U. S. Eng., 1006 McCall Bldg., 14 steel pontoons, to St. Louis Structural Steel Co., 57th St. and Baltimore & Ohio tracks, to East St. Louis, Ill., $18,400; 12 sections 32 in. dredge pipe, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., $4,346. Noted Sept. 16 and 17 Daily.

Tex., Fort Sam Houston—SHOPS—Con. Q. Dallas, Tex., M., general contract 47 x 506 ft. engineering shops, 60 x 66 ft. dope house, 10 x 50 ft. boiler house, all 1 story, Duncan Field, to A. J. Rife Constr. Co., 1913 North Harwood St., Dallas. $679,000. Noted Sept. 9 Daily.

Tex., Randolph Field—PAVING—Con. Q.M., grading, curbing, asphalt on 3 in. gravel surfacing 202,000 sq.yd., to Amiesite Co. of Texas, Republic Bank Bldg., Dallas, $218,005.

SUBWAYS AND TUNNELS

PROPOSED WORK

Calif., Fresno—City and Southern Pacific R.R. Co., 65 Market St., San Francisco, G. W. Boschke, ch. engr., preliminary plans Belmont Avenue Subway, incl. 22,000 cu.yd. excav., 1,970 cu.yd. mass concrete, 160 cu.yd. concrete in handrail, 801 cu.yd. rein.-con., 108,000 lb. reinforcing and 309,500 lb. structural steel, 4,200 sq.ft. waterproofing, $210,000. Noted Oct. 1.

Ont., Toronto—City subway on extension southerly of Don Roadway, concrete founds, abutments, retaining walls, steel beams and girders, grading. $150,000. R. C. Harris, City Hall, engr.

Ont., Toronto—City, Canadian Pacific Ry., B. Ripley, ch. engr. (Toronto Dist.) Toronto, and Canadian National Ry. Co., T. T. Irving, Toronto, ch. engr. (Central Region), steel, concrete subways, at Greenwood, Woodbine, Pope, Logan, Jones and Victoria Park Aves. $500,000. R. C. Harris, city engr.

Ont., Windsor—City, Canadian Pacific Ry., B. Ripley, Toronto, ch. engr. Ontario Dist., Essex Terminal Ry. & Co., H. W. Patterson, Walkerville, ch. engr., structural steel, concrete subway under tracks, Tecumseh St. $280,000. R. J. Desmarais, City Hall, engr.

CONTRACTS AWARDED

Calif., San Jose—Southern Pacific R.R. Co., 65 Market St., San Francisco, G. W. Boschke, ch. engr., rein.-con., steel subway in The Alameda, to R. E. McKee, 108 West 6th St., Los Angeles, $125,000.

Ont., Windsor—See "Sewers."

GRADE CROSSINGS

PROPOSED WORK

Calif., Fresno—See "Subways and Tunnels."

N. J., Picton—Lehigh Valley R.R. Co., G. T. Hand, ch. engr., 143 Liberty St., New York, steel, concrete viaduct, Central Ave. $200,000. **Maturity probably soon.**

CONTRACTS AWARDED

N. Y., Willsboro—Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, eliminating Willsboro and Jacobs Crossings, to Spellman & Oliver Co., Chateaugay, $45,923. Est. $84,705.

DAMS

PROPOSED WORK

Montana—State, J. S. James, Helena, state engr., 1,601 ft. concrete dam, 420 ft. high, and reservoir in south fork Flathead River, south of Coram.

N. Y., McKeever—Black River Regulating Dist., c/o State Conservation Comn., Albany, 2,000 ft. dam, maximum height 190 ft., on south branch Moose River, near here. $4,000,000.

PIERS AND WHARVES

PROPOSED WORK

Ont., Toronto — DOCK — Toronto Harbour Comrs. Harbour Bldg., plan 500 x 600 ft. dock east of Yonge St. wharf, incl. concrete head-walls, on piles with earth fill behind, sheet piling, etc. $650,000. J. G. R. Wainwright, Harbour Bldg., engr.

AIRPORTS

BIDS ASKED

Mass., Boston—Oct. 9, by Commonwealth of Massachusetts, Armory Comn., J. H. Agnew, chn., 1 and 2 story, 180 x 200 ft., brick, steel, air corps building, 26th Division Aviation M.N.G., Porter St., East Boston. $250,000. C. F. Springall, 50 Park St., Malden, archt. J. Whitney, 250 Stuart St., engr. Noted Sept. 10.

CONTRACTS AWARDED

Ill., Chicago—American Airways, Inc., Lambert Field, Robinson, Mo., and 122 East 42nd St., New York, 160 x 200 ft. brick, steel, concrete hangar and shop, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $100,000. Noted July 9.

Mo., Kansas City—Transcontinental & Western Air, Inc., Kansas City and 420 Lexington Ave., New York, hangar, lean-to for machine shop, motor testing building, Municipal Airport, to S. Patti Constr. Co., Finance Bldg. Est. $300,000. Noted Aug. 12.

POWER AND LIGHTING

PROPOSED WORK

Arizona—Arizona Electric Lighting Co., Winslow, applied for franchise to construct transmission line from Winslow to Holbrook. $75,000. Noted May 7.

Arkansas—Missouri Power Co., R. G. Yumpkins, mgr., Walnut Ridge, 20 mi. power line from Walnut Ridge to Bono. $35,000. Private plans.

Mo., University City—City, E. D. Ruth, Jr., Mayor, surveys lighting system, incl. whiteway lighting for business district. B. Toensfeldt, Security Bldg., St. Louis, engr.

Okla., Britton—Western Service Corp., Braniff Bldg., Oklahoma City, E. R. Ernsberger, pres., granted franchise gas distribution system. $40,000. E. Tlesher, c/o owner, ch. engr. Noted Sept. 22.

BIDS ASKED

Tex., Santa Anna—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Grafton—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, renewing steam lines State Hospital, to P. F. Russo Co., 58 Austin St., Hyde Park, $27,880. Noted Sept. 3.

Mich., Detroit—Public Lighting Comn., East Atwater St., extending lighting system on Chene St., incl. laying conduits, manholes, handholes, lighting standards, connections, to Gaffney Constr. Co., Union Bldg., Cleveland, O., $29,979.

Mississippi—See "Streets and Roads."

Tex., Santa Anna—Santa Anna Gas Co., R. Tilson, pres., Tyler, natural gas system, incl. 15,000 ft. 4 in., 40,000 ft. 2 in., 25,000 ft. 1 in. c.i. pipe, 400 meters and regulators, own forces; equipment, to Westcott & Gries, Inc., Tulsa Trust Bldg., Tulsa, Okla., and Continental Supply Co., 1501 Locust St., St. Louis, Mo. Est. $100,000. H. V. Flemming, c/o Owners Tyler and Santa Anna, and 1115 South Quaker St., Tulsa, Okla., engr.

PARKS AND SPORTS

PROPOSED WORK

Ariz., Phoenix—City expending $140,000 improving Mountain Park. G. Todd, city engr.

Calif., Pasadena—Bd. City Dirs. retained W. L. Bell, landscape architect to prepare plans 18-hole golf course in The Arroyo Seco. $70,000.

Mo., University City—Park Bd. A. E. Veith, chn., 180x200 ft. outdoor swimming pool, concrete, stucco bathhouse, purification and recirculating system, in Heman Park, Oliver Blvd.

N. H., New Ipswich—Appleton Academy, 1 story, 60 x 85 ft., brick, concrete, athletic gymnasium. $50,000. H. L. Meacham Associates, 120 Front St., Worcester, Mass.

Va., Norfolk—John Papulias, Steubenville, O., amusement park at Park Chesapeake on Chesapeake Bay. $200,000. **Maturity in 1932.**

Ont., Port Arthur—Port Arthur Arena Co., Ltd., plans 145 x 264 ft., concrete, brick, steel, ice arena, Court St. $65,000. C. D. Howe & Co., Whalen Bldg., engrs.

BIDS ASKED

N. H., Manchester—See "Contracts Awarded."

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Parks and Sports (Continued)

N. Y., Brooklyn—Oct. 13, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, altering standpipe system Sect. F and G, Central Museum of Brooklyn Institute of Arts & Sciences, Eastern Parkway and Washington Ave., McKim, Mead & White, 101 Park Ave., New York, archts.; improving city park, Park and Flushing Aves., St. Edwards and Navy St.

N. Y., New York—Oct. 13, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, general contract tennis house, Crotona Park, Bronx Boro; asphaltic concrete roadway pavement in Battery Park, and removing loose rock and safe guarding rock cuts Riverside Dr., between West 181st and Dyckman Sts., Manhattan Boro.

CONTRACTS AWARDED

N. H., Manchester—W. Scott, c/o A. W. Osberg, archt., 795 Elm St., Arena, Nashua Rd., separate contracts. Est. $50,000.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, restoring public beach at Coney Island, to W. H. Gahagan Realty Co., 147 Remsen St., $40,000. Noted Sept. 10.

Ont., Windsor—See "Sewers."

HEATING AND VENTILATING

BIDS ASKED

N. Y., College Point—Oct. 15, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, heating, ventilating, electrical work, plumbing and drainage at P. S. 129, 7th and 9th Aves., 129th and 128th Sts., for Bd. Educ., 500 Park Ave., New York.

CONTRACTS AWARDED

Calif., Los Angeles—See "Schools."

Neb., Omaha—School for Deaf, c/o State Bd. Control, State Capitol Bldg., Lincoln, furnishing, installing 2 water tube boilers, incl. special breeching, soot blowers, feed water regulators, brick work, oil fired, oil burning equipment, to J. F. Pritchard & Co., Dwight Bldg., Kansas City, Mo., $18,510.

N. J., Montclair—State Bd. Educ., State House, removing old boilers and installing oil burning equipment, to G. Stewart, 270 South 20th St., Newark. Est. $25,000. Noted Sept. 3.

N. Y., Buffalo—Adjutant General, State Capitol, Albany, heating, boilers, replacing boilers, repairing heating system, 174th Armory, to W. E. Shaddock, 295 Oak St., $12,373. Noted Sept. 3.

UNCLASSIFIED

PROPOSED WORK

Colorado—PIPE LINE—Grimes Pipe & Supply Co., 1300 Larimer St., Denver, and Charles Chatfield, secy. Bd. Land Comrs., will build 12 mi. 12 in. pipe line from Crow Creek to Greasewood Flat Oil Fields.

Mass., Quincy—COMFORT STATION—City, T. J. McGrath, mayor, comfort station. Engineer not appointed.

N. Y., New York—ALTERING—A. L. Berman, 1133 Bway., lets contracts about Oct. 15, altering apartment, incl. steam heating plant, incinerator, plumbing, 25 West 106th St. $25,000. Bids in. A. J. Simberg, 1133 Bway., archt. Noted Aug. 27.

Ohio—NATURAL GAS PIPE LINE—Simms Oil & Gas Co., Belle Center, soon lets general and separate contracts 33 mi. natural gas pipe line from Belle Center to Ridgeway. $200,000.

Texas — FENCE — Kinney Co., Brackettville soon takes bids 12 min. wolf-proof fence along southern line county.

Tex., Port Lavaca—NATURAL GAS SYSTEM, etc.—Texas Natural Gas Utilities, Petroleum Bldg., Houston and Port Lacava, natural gas system, incl. 35,000 ft. 2 to 4 in. welded joint c.i. pipe. Owner does most of installation. $45,000.

Utah, Salt Lake City—MESS HALLS—Utah Natl. Guard, c/o Brig. Genl. W. G. Williams, Capitol Bldg., 10 mess halls, bath houses, telephone system at Camp W. G. Williams. $60,000. Engineer not appointed.

BIDS ASKED

Mo., St. Louis—MARKET—Oct. 27, by Bd. Pub. Serv., City Hall, 1 story, boiler room, 72 x 194 ft., concrete, steel market, incl. 34 x 110 ft. shelter platform and 30 x 100 ft. open platform, 13th St. from Biddle to O'Fallon Sts. $94,637. A. Osburg, City Hall, archt. L. R. Bowen, City engr. Noted July 30.

CONTRACTS AWARDED

Mich., Grand Rapids—GRAVEL PLANT—W. J. Breen Gravel Co., Wyoming and Grandville Rds., gravel washing plant, incl. concrete tunnel under hy., with conveyors, loading docks on property adjacent to railroad washing plant, 4 concrete storage bins, to Owen, Ames Kimball Co., Grand Rapids. Est. $100,000.

Missouri and Oklahoma—PUMPING STATIONS—Stanolind Pipe Line Co., Philcade Bldg., Tulsa, Okla., 1 story, 36 x 66 ft., concrete, brick, steel, tile additions to pumping stations in Carrollton, Freeman, Marceline, and Odessa, Mo. and in Hominy and Hulan, Okla., to W. R. Grimshaw Constr. Co., Kennedy Bldg., Tulsa, Okla. Est. $90,000.

Pa., Phila.—TEST BORINGS—Dpt. City Transit, C. E. Myers, dir., City Hall Annex, Contr. 9, test borings in Roosevelt Blvd., Broad St. and Steuben Ave., to Sprague & Henwood, Real Estate Trust Bldg., $3,815; Contr. 248, alterations, additions to city hall station and miscellaneous work Broad Street Subway Bldg., to Kaufman Constr. Co., 26 South 15th St., $52,343. Noted Sept. 17.

Tex., Beaumont—STEEL PLATES—Empire Oil & Refining Co., Bartlesville, Okla., 2,000 tons steel plates for tanks, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill.

Alta., Edmonton—COAL HANDLING EQUIPMENT—City Council, ash and coal handling equipment, to Fairfield Eng. Co., Marion, O., $26,914.

Ont., Toronto—STORAGE TANK—Sun Oil Co., Ltd., foot Bouchette St., excavation work in connection with 540,000 gal. capacity steel storage tank, Bouchette and Commissioners Sts., to Bonvivere Co., Ltd., Confederation Life Bldg., piling to Richardson Constr. Co., Ltd., 10 Adelaide St. E. Est. $25,000.

MATERIALS

BIDS ASKED

ROAD OIL—**Fresno, Calif.**—Oct. 16, by D. M. Barnwell, clk. 125,000 to 175,000 bbl. road oil.

CAST IRON PIPE—**Oakland, Calif.**—J. H. Kimball, secy. East Bay Municipal Dist., taking bids 121,000 ft. 4, 6 and 8 in. c.i. pipe.

RAILS, ANCHOR BOLTS, etc.—**Mississippi**—See "Streets and Roads."

ASPHALTIC OIL—**Trenton, N. J.**—Oct. 22, by E. J. Quigley, state purch. agt., State House, 42,250 gal. Grade HK asphaltic oil or Grade UC or KP tar.

CAST IRON PIPE—**New York, N. Y.**—Oct. 14, by P. J. Dooling, comr. Purchasing, Municipal Bldg., furnishing, delivering, unloading, stacking and storing c.i. pipe, special and valve box castings, valve and double nozzle fire hydrants, to Dpt. Water Supply, Gas & Electricity.

CONTRACTS AWARDED

PIG LEAD—**Oakland, Calif.** — East Bay Municipal Dist., 50 tons pig lead, to American Smelting & Refining Co., 201 1st St., San Francisco, $4,400.

CAST IRON PIPE—**Lincoln, Neb.**—City, 32,000 tons 36 in. c.i. pipe for water lines, to U. S. Cast Iron Pipe & Fdry. Co., 760 East Pearl St., Burlington, N. J.

STONE, etc. — **Morristown, N. J.** — Bd. Freeholders Morris Co., Court House, 7,800 cu.yd. smashed stone and gravel, to Gallo Sand & Gravel Co., Netcong, $11,700.

LIME—**Newark, N. J.**—North Jersey W. Supply Comn., Service Bldg., 400 tons "Bell Mine" hydrated lime at Wanaque, to Harrison Supply Co., Central Ave., at $12.70 per ton, total $5,880.

EQUIPMENT

PROPOSED WORK

MOTORS and PUMP—**Crown Point, Ind.**—City Comrs. postponed taking bids to have been opened Sept. 8, two 100 kw. Diesel driven motors and two 250 g.p.m. deep well pumps for light plant, $33,000. Burns & McDonnell Eng. Co., 406 Interstate Bldg., Kansas City, Mo., engrs. Noted Sept. 3.

CRANE and DERRICK — **Memphis, Tenn.** — See "Warehouses."

BIDS ASKED

TRUCK—**Wash. D. C.**—Oct. 12, by Comrs. Dist. Columbia, 1 automobile truck, 28,000 lb. gross load, for municipal garage.

TRUCKS, SNOW PLOWS, etc.—**Iowa**—Oct. 13, by State Hy. Comn., Ames, 10 heavy duty truck snow plows for use on 3 to 4 ton heavy duty trucks, light plows for use on Ford or Chevrolet trucks, 13 motor graders, 10 maintenance plows of 4 removal work.

GAS SHOVEL — **Amesbury, Mass.** — J. E. Watkins, Inc., 41 Power St., in market for gas shovel, power grader, for road work.

SURFACER—**Trenton, N. J.**—Oct. 9, by State Purchase Comn., State House, one Oliver 61-B 30 in. surfacer. $5,000. Private plans.

ENAMELED SIGNS—**New York,, N. Y.**—Oct. 16, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing, installing enameled signs at stations Independent System City-owned Rapid Transit Railroads, Manhattan Boro, Agreement "LG."

REGULATING TRANSFORMERS—**Cleveland, O.**—Oct. 9, by City, constant current regulating transformers.

FIRE ALARM EQUIPMENT—**Tulsa, Okla.**—Oct. 16, by City Comrs, E. Logan, aud., furnishing, installing 226 fire alarm boxes, 21 fire alarm box circuits, new equipment supplementing that now in use in 12 stations 110 fire alarm pedestals, signal lamps, wiring, switch boards, transformers, generators, storage batteries. $240,000. Smith & Senter, 307 Philtower Bldg., Tulsa, archts. R. F. Taylor, Santa Fe Bldg., Dallas, Tex., engr.

ASPHALT MIXING UNIT—**Scranton, Pa.**—Oct. 22, by Dpt. P. Wks., delivering complete asphalt mixing unit, as per specifications Scranton Bureau of Engineering, f.o.b. cars Scranton. F. J. Miller, dir.

CONTRACTS AWARDED

STEAM TURBINE—**Pella, Ia.**—City Coun A. C. Kuyper, city clk., steam turbine, to Mu Iron Wks., Burlington, $41,736.

GATE VALVES—**Minneapolis, Minn.**—F. Gram, city purch. agt., one 40 in., one 30 and two 36 in. gate valves, to J. B. Clow Son, 640 McKnight Bldg., $4,130.

SWITCHBOARD and TURBINE GENERA ING UNIT—**Norfolk, Mass.**—Commonwealth Massachusetts, Dept. Correction, State Ho Boston, switchboard to Worcester Electric L Co., 89 Broad St., Boston; turbine unit, General Electric Co., 140 Federal St., Bost Est. $10,000. Noted Sept. 17.

FOREIGN

South America, Ecuador—Dec. 14, highw between Guayaquil and Salinas through Sa Elena. Specifications to be supplied at C sulate General of Ecuador, 17 Battery Pl., N York.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

N. J., Newark—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarde

N. Y., New York—See "Contracts Awarde

CONTRACTS AWARDED

N. J., Newark—Verona Constr. Co., A. Mel 60 Park Ave., 3 story, basement, brick, st Stuyvesant Ave., separate contracts. $150,0 Harris & Sohn, 17 Mechanic St., Newa archts.

N. Y., Brooklyn—Corporation, c/o H. Goldberg, 1895 East 8th St., 6 story, 80 x 160 f Nathan and Ocean View Aves., separate co tracts. $196,000. J. J. Millman, 67 Cou St., arch.

N. Y., Brooklyn—Melbert Constr. Corp., Marine Ave., 6 story, 75 x 84 ft. 95th St. a Marion Ave., separate contracts. $150,0 Tabatchnick & Book, 32 Cort St., archts.

N. Y., Brooklyn—Safe Way Investors, In 136 Lawrence St., 2 story, 14th Ave. and 85 St., separate contracts. $150,000. B. A. Glassan, 44 Court St., archt.

N. Y., New York—East 56th Street, In 232 Madison Ave., 11 story, 69 x 114 ft., East 56th St., separate contracts. $400,00 A. Weiser, 510 Madison Ave., archt.

O., Shaker Heights—South Shaker Buildi Co., C. Bernstein, 810 Swetland Bldg., Clevela 3 story, basement, 65 x 120 ft., brick, Nort Moreland Blvd., to W. Dolin, 810 Swetland Bl Est. $200,000.

CLUBS

PROPOSED WORK

Mass., Falmouth—Marine Lodge of Full an Accepted Masons, R. C. Jenkins, Falmouth, Masonic Temple, store, Main St. $150,000 o more funds being raised for same.

N. Y., New York—Cosmopolitan Club, 13 West 40th St., lets general contract about Oc 15, 10 story club, 122 East 66th St. $200,00 Bids in. T. H. Ellert, 101 Park Ave., archt. Noted July 30.

N. Y., Atlantic Beach—Atlantic Beach Club, 6 story, club-apartment, $150,000. J. Urba 5 East 57th St., New York, archt. **Maturity in November.** Noted Sept. 24.

BIDS ASKED

Mich., Detroit—Geo. D. Mason & Co., archts., 409 Griswold St., bids about Oct. 15, 3 story, basement, brick, steel, stone, rein.-con., dormitory, plain found., Elizabeth St., for Y.M.C.A., c/o A. Studer, Y.M.C.A. $150,000.

Neb., Lincoln—Oct. 19, by Lincoln Y.W.C.A., C. Petrus Peterson, pres., 3 story, basement, 100 x 142 ft., concrete, brick, stone, terra cotta club, incl. swimming pool, gymnasiu cafeteria, 15th and N Sts. $165,000 Meginnis & Schaumberg, 614 Federal Trust Bldg., archts.

Mass., Fitchburg—Fitchburg Lodge of Elks, D. H. Merriman, chn., Building Comn., altering and constructing 3 story, basement, brick, Elk's Home addition, plain found., 133 Pritchard St., to G. A. Fletcher & Co., 215 Blossom St. Est. $150,000.

HOSPITALS

PROPOSED WORK

Mass., Middleton—Comrs. Essex Co., Salem, plans tuberculosis hospital addition. $150,00 or more. Architect not appointed.

Mich., Newberry—Newberry State Hospital plans by Derrick Hubert, Menominee, 3 story, basement, brick, steel, concrete, stone medical unit to hospital, plain found. $360,000.

Tex., Houston—City, c/o W. E. Montieth, mayor, and Harris Co., c/o H. L. Washburn, aud., plans by A. C. Finn, 505 Bankers Mortgage Bldg., and J. Finger, 711 Nat. Stand. Ins. Bldg., and soon takes bids 9 story, tower, brick stone hospital, incl. main building, utilities and laundry building and nurses home. $1,500,00 R. J. Cummings, 727 Bankers Mortgage Bldg. engr. Noted June 11.

Hospital (Continued)

BIDS ASKED

Mich., Ypsilanti—Oct. 13, by G. R. Thompson, budget dir., Lansing, two 3 story, basement, brick, stone, rein.-con. hospital buildings, plain founds., York Twp. $400,000. Albert Kahn, Inc., 1000 Marquette Bldg., Detroit, archts.

N. Y., New York—Nov. 1, by B. H. Whinston, archt., 6 East 46th St., general contract 10 story, penthouse, 2 basement, 84 x 92 ft. hospital, 166th St. and Grand Concourse, for Bronx Maternity Hospital. Noted June 11.

CONTRACTS AWARDED

Conn., Shelton—State Tuberculosis Com., brick, steel infirmary, nurses home, 2 physicians cottages, to Chas. Smith & Sons, 101 Water St., Derby, $394,000. Noted Sept. 17.

Idaho, Blackfoot—A. Harbour, comr. P. Wks., Boise, 3 story, basement infirmary building for State Mental Hospital, to Jacobsen Constr. Co., Interurban Bldg., Salt Lake City, Utah, $122,000. This corrects report in Oct. 1 issue.

Ill., Chicago—Commissioners of Cook Co., County Bldg., general contract 17 story, basement, 162 x 202 ft., nurse's home, to Mutual Constr. Co., 2532 Warren Ave.; heating, to Economy Heating & Plumbing Co., 1308 South Crawford Ave.; refrigeration, to Wittemeir Machy. Co., 850 North Spaulding Ave. Rejected bids electrical work, will readvertise. Noted July 16.

Neb., North Platte—Great Planes Community Hospital Assn., E. C. Kelso, secy., general contract 3 story, basement, 46 x 156 ft., rein.-con., brick, stone hospital, to E. Walker, 1105 East Front St., $91,575; heating and plumbing, to North Platte Heating & Plumbing Co., 106 East 6th St.; electric wiring, to Crawford Electric Co., 518 Jeffers St. Noted Jan. 22.

CHURCHES

PROPOSED WORK

Mass., Walpole—United Church of Walpole, L. C. Schroder, pastor, Main St., plans by Perry, Shaw & Hepburn, 141 Milk St., Boston, 1 story, basement church, East St. $200,000. Project in abeyance. Noted Sept. 17.

N. Y., Albany—Temple Baptist Church, 4 Ten Broeck St., plans by E. Roth, 1440 Bway., New York, 12 story, brick church, apartment, State and High Sts. To exceed $150,000. **Maturity indefinite.**

N. Y., Albany—Trinity Methodist Episcopal Church, Lark St., sketches by E. M. Connor, 301 Arch St., Phila., Pa., 2 story, brick, Lancaster and Lark Sts. $400,000.

N. Y., Albany—United Presbyterian Church plans by G. E. Savage, 1321 Walnut St., Phila., church, Western Ave. and Orlando St. $200,000. **Maturity in 1932.**

N. J., Allwood—Catholic Diocese of Newark, 22 Mulberry St., Newark, 2 story, basement, brick, steel, Allwood Rd. $150,000. **Maturity probably soon.** Architect not appointed.

BIDS ASKED

N. Y., West New Brighton—Sibley & Featherston, archts., 215 East 42nd St., New York, taking preliminary bids, 2 story, basement, brick, steel, school, Clinton Ave. for St. Paul's Roman Catholic Church, 134 Franklin Ave., St. George. $150,000. Noted Sept. 24.

CONTRACTS AWARDED

N. Y., Garrison—Province of St. Joseph, Order of Minor Capuchins, 4 story, 131 x 218 ft. monastery and college, to Sobray Whitcomb, 105 West 40th St., New York. Est. $500,000.

N. Y., Troy—Sisters of St. Joseph, chapel, to C. P. Boland, 101 Park Ave., New York. Est. $400,000. Noted Oct. 1.

SCHOOLS

PROPOSED WORK

Mass., Boston—City Dpt. School Buildings, sketches by McLaughlin & Burr, 88 Tremont St., 3 story, basement, brick, steel, Boys Latin School, plain found., Louis Pasteau Ave., Fenway Dist. $850,000. Noted Sept. 10.

Mass., Melrose—City Building Comn., plans by J. W. Beal Sons Co., 185 Devonshire St., Boston, 3 story, basement, brick, stone, steel, high school, Lynn Fells Parkway. $715,000. Noted Feb. 5.

Mass., Springfield—City, C. J. Morrow, chn. building comn., plans by E. C. and G. C. Gardner, 33 Lyman St., 3 story, basement, irregular sized, brick, steel technical school, concrete found., Elliott St. $450,000. Project postponed for 1 year. Noted July 23.

N. J., Carlstadt—Bd. Educ., Boro Hall, sketches by Hacker & Hacker, 201 Main St., Fort Lee, and bids about November, 2 story, basement, brick, steel, rein.-con., grade and high school, Washington St. $150,000. Noted Sept. 17.

N. J., Hackensack—Bd. Educ., 355 State St., 2 story, basement, brick, steel school, Union St. $210,000. **Maturity probably in January.** A. Dore, 155 Main St., archt. Noted Sept. 10.

N. J., Sussex—Bd. Educ., J. W. Wilson, clk., rejected bids Sept. 29, 2 story, basement, brick, steel high school. $155,000. Jacoby & Everett, Commonwealth Bldg., Allentown, Pa., archts. Noted Sept. 24.

N. Y., Brockport—Bd. Educ., plans by Dryer & Dryer, Rochester, school incl. gymnasium, auditorium. New Central High School. $425,000. Noted Sept. 3.

N. Y., Clinton—Bd. Educ., plans by A. E. Gilbert, 338 5th Ave., New York Central High School. $300,000.

N. Y., Delmar — Bd. Educ., 439 Delaware Ave., plans by Fuller & Robinson, 100 State St., Albany, high school. $400,000.

N. Y., New York—Children's Aid Society, W. C. Osborn, 105 East 22nd St., plans by L. E. Jallade, 15 East 22nd St., altering 9 story school, incl. elevator, 106 Mott St. $150,000.

N. Y., New York—Bd. Educ., 500 Park Ave., plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, 4 story, P. S. 85, Marion Ave. and 187th St. $863,000.

N. Y., New York—Society for Ethical Culture, 2 West 64th St., school, Fieldston Ave. $250,000.

N. Y., Watervliet—Bd. Educ. plans by M. F. Cummings & Son, State Bank Bldg., Troy, high school addition. $150,000.

Pa., Hershey—Hershey Industrial School plans by P. D. Witmer, Hershey, vocational school. $1,500,000.

BIDS ASKED

Mass., Roslindale (sta. Boston) Oct. 16, by City of Boston, Dpt. School Buildings, 2 story, basement, brick, stone, steel, plain found., Charles Sumner Dist., Poplar and Dale Sts. To exceed $150,000. W. W. Drummet, 80 Boylston St., Boston, archt. Noted Sept. 10, under "Boston."

CONTRACTS AWARDED

Calif., Eldridge—State Division of Architecture, Sacramento, general contract 1 story, rein.-con. school and ward building, to W. Spivock, Hobart Bldg., San Francisco, $74,333; plumbing, to J. A. Fazio, 402 Castro St., Oakland, $6,166; electric work, to Decker Electric Constr. Co., 538 Bryant St., San Francisco, $2,704; heating, to F. W. Snook Co., 596 Clay St., San Francisco, $8,660. Grand total $91,863. Noted Sept. 10.

Calif., Los Angeles—P. J. Walker Co., general contractor, 117 West 9th St., sub-contracts 4 story, 170 x 245 ft. rein.-con. library building, for University of Southern California, 3551 University Ave., plumbing, to Thomas Haverty Co., 316 East 8th St.; heating, to Pacific Pipe & Supply Co., 1002 Santa Fe Ave.; ventilating, to H. S. McClelland, 1930 South Compton Ave.; electric wiring, to Golden State Electric Co., 826 South Flower St., limestone, to McGilvray Raymond Corp., 678 South Anderson St.; elevators, to Consolidated Steel Corp., 1200 North Main St. Total est. $1,000,000. Noted July 2.

N. J., Kearny (sta. Arlington)—Bd. Educ., E. Stevenson, secy., Garfield, school, general contract, Roosevelt School, 3 story, basement, 65 x 210 ft., brick, steel, to L. Deutsch, Inc., 879 Bergen St., Newark, $190,000; plumbing, to R. B. Smith, Inc., 62 Ann St., Newark, $11,532; heating, to Burns, Lane & Richardson Co., 1107 Broad St., Newark, $39,621; electrical work, to Badaracco, Bros. Co., 403 Washington St., Hoboken, $12,046; steel and ornamental iron work, to Globe Iron Wks., Inc., 168 West 24th St., Bayonne, $11,500. Grand total, $264,699. Noted Sept. 10.

N. J., Oakhurst—Bd. Educ., Ocean Township, F. R. Taylor, dist. clk., general contract 2 story, basement, brick, steel, school addition, Monmouth Rd. to H. Schultz, Interlake, est. $150,000; plumbing and heating to P. J. Eager, Inc., 28 2nd Ave., Long Branch; electrical work to Hope Electric Co., 420 Main St., Asbury Park; steel, ornamental iron to Asbury Bridge & Iron Wks., 11th Ave., Asbury Park.

N. J., Newark—Bd. Educ., City Hall, general contract Weequahic Junior and Senior High School, 4 story, basement, brick, steel, rein.-con., to Pellacchia Constr. Co., 50 Branford Pl., $610,000; plumbing, to W. J. Paterson, 717 South Orange Ave., $56,000; heating and ventilating, to D. McGrath Co., 185 Moore St., Hackensack, $75,876; steel and iron, to Maxwell Spiro & Co., 241 Communipaw Ave., Jersey City, $78,000. Grand total, $820,776. Noted Sept. 24.

BANKS

PROPOSED WORK

N. Y., Brooklyn—Lincoln Savings Bank, 531 Bway., bids after Oct. 5, general contract 2 story, basement, 42 x 100 ft. Church and Nostrand Aves. $175,000. Koch & Wagner, 32 Court St., archts. Noted Sept. 24.

N. Y., Brooklyn—First Mortgage Securities Corp., 2650 Atlantic Ave., bids after Oct. 15, general contract 1 story, bank, Pitkin and Hopkinson Aves. $150,000. Halsey, McCormick & Helmer, 286 5th Ave., New York, archts. Excavation awarded to Kaye Constr. Co., 130 Flatbush Ave. Noted Sept. 24.

N. Y., Albany—Albany County Saving Bank, 88 State St. 12 story bank, office, State and Pearl Sts. To exceed $150,000. Architect not announced.

BIDS ASKED

Tex., Tyler — Oct. 15, by Peoples National Bank, c/o A. Lindsay, chn. Bd., 17 story, basement, face brick, granite, stone, tile, rein.-con., steel bank and office building. 4 stories to be 60 x 120 ft., and 13 stories, 60 x 60 ft. $500,000. A. C. Finn, 505 Bankers Mortgage Bldg., Houston, archt. R. J. Cummings, 727 Bankers Mortgage Bldg., Houston, engr. Noted Aug. 27, under "Bids Asked."

CONTRACTS AWARDED

Kan., Topeka—National Bank of Topeka, C. W. McKeen, pres., general contract 14 story, basement 75 x 115 ft. (157 ft. high), rein.-con. steel, stone bank and office, to F. M. Spencer & Son, 1805 Harrison St., heating, ventilating and plumbing, to Bass & Linton, 505 West 6th St., electric wiring, to Overton Electric Co., 522 Jackson Ave. Noted Sept. 3.

OFFICES

PROPOSED WORK

N. Y., Watertown—Medical Arts Building, Inc., plans by D. D. Kief, Watertown, 6 story, 53 x 88 ft. stone, medical art building. $300,000 to $350,000. Noted July 7.

STORES

PROPOSED WORK

Mass., Quincy—E. J. Johnson, c/o Blackall, Clapp, Whittemore & Clark, archts., 31 West St., Boston, revised plans 4 story, basement, 50 x 120 ft., brick, stone store, office, plain found., Maple and Hancock Sts. $150,000. Former bids rejected. Noted Apr. 23.

N. J., Newark—Psichos Corp., c/o M. Mancisi-Ungaro, archts., 207 Market St., will not build 2 story, basement, brick, steel, store, apartment, Roseville and 1st Aves. $150,000. Bids rejected, project abandoned. Noted Sept. 17.

N. Y., New York—Brunswick Realty Co., R. P. Zebel, pres., 239 4th Ave., plans by W. E. Volckening, 145 West 45th St., 12 story store, apartment, 10 East 29th St. $150,000.

BIDS ASKED

N. J., Newark—N. Siegler, archt., 164 Market St., bids about Oct. 15, general contract 2 story, basement, brick, steel store, offices, 55 Market St., for Owner, c/o architect. $150,000.

LOFTS

PROPOSED WORK

N. Y., New York—May Radio & Television Corp., c/o D. W. May, 112 Bleecker St., remodeling, altering 6 story loft, 380 Lafayette St. To exceed $40,000.

PUBLIC

PROPOSED WORK

Mass., Norfolk — DORMITORIES—Commonwealth of Massachusetts, Dpt. Correction, State House, Boston, plans by Monks & Johnson, 99 Chauncy St., Boston, and soon takes bids 2 story, basement, irregular sized, brick, rein.-con., farm dormitory, $125,000 to $150,000, plans by McLaughlin & Burr, 88 Tremont St., Boston, dormitory 2, 3 story, basement, 45 x 275 ft., brick, rein.-con., plain founds., both at State Prison Colony. $175,000. Noted Mar. 5.

N. Y., Jamaica—ARMORY—Armory Bd., Municipal Bldg., New York, bids in latter part November, general contract 166 x 586 ft. armory, 93rd Ave. and 168th St. $1,750,000. C. B. Meyers, 31 Union Sq., New York, archt. Noted Aug. 6.

Tex., Galveston—IMMIGRATION—City plans by Bottomley, Wagner & White, 112 East 55th St., New York, and soon takes bids 3 story, brick, tile, 17th and 18th Sts., Avenues A and B. $375,000.

BIDS ASKED

Mass., Cambridge—COURT HOUSE—Oct. 13, by Middlesex Co. Comn., W. C. Wardwell, chn., brick, stone, 3rd and Spring Sts., East Cambridge. $200,000. C. R. Greco, 11 Beacon St., Boston, archt. Noted Oct. 1.

CONTRACTS AWARDED

Mass., Revere—POLICE STATION—Commonwealth of Massachusetts, Metropolitan Dist. Comn., Boston, altering and constructing addition, Revere Beach to A. A. Gillis Constr. Co., 313 Washington St., Boston. Noted Sept. 10.

R. I., Providence—FIRE STATION—City, P. Buildings Dpt., 2 story, basement, brick, concrete, steel fire station, plain found., to P. I. Flynn, Industrial Trust Bldg. Est. $150,000. Noted Sept. 10.

UNCLASSIFIED

PROPOSED WORK

Ia., Sioux City—STATION—City Council and various railroads entering city, preliminary negotiations under way 4 story, basement, 100 x 250 ft., rein.-con., brick, steel, stone freight and passenger station, also rein.-con. subway approach to station. L. Hintgen, city engr., L. J. Hammond, 120 South La Salle St., Chicago, Ill., consult. engr. $1,000,000.

N. J., Fort Lee—BUS TERMINAL—Pub. Serv. Co-Ordinated Transport Co., 80 Park Pl., Newark, brick, steel, Main St. to Abbott Rd. $150,000. **Maturity probably soon.** Private plans.

N. J., Princeton—LABORATORY—Rockefeller Institute, York Ave. and 66th St. bids in November, general contract laboratory, animal and plant pathology. $150,000. Coolidge, Shepley, Bulfinch & Abbott, Ames Bldg., Boston, Mass., archts. Noted Sept. 3.

N. Y., Glens Falls—EXCHANGE—New York Telephone Co., 140 West St., New York, soon lets contract telephone exchange. $150,000. Voorhees, Gmelin & Walker, 101 Park Ave., New York, archts.

Unclassified (Continued)

BIDS ASKED

Tex., Houston — PASSENGER STATION — Southern Pacific Ry. Co., G. W. Boschke, ch. engr. System, San Francisco, Calif., bids about Dec. 15, passenger station. $3,500,000. W. K. Hedrick, Inc., Post Dispatch Bldg., Houston, and 1005 1st Natl. Bank Bldg., Fort Worth, archts. Noted Aug. 6.

CONTRACTS AWARDED

Ill., Chicago—FINE ARTS—South Park Comrs., c/o M. E. Connelly, secy., 57th St. and Cottage Grove Ave., completing interior of restoration of Fine Arts Building, 4 blocks long, 2 blocks wide in Jackson Park, to R. C. Wieboldt Co., 1412 West Washington Blvd., Noted July 23.

N. J., Newark—AUDITORIUM—Kruger Auditorium, 15 Belmont Ave., general contract altering and constructing 3 story, basement, brick, steel, auditorium addition, 15 Belmont Ave. to Standard Constr. Co., 94 Boylston St., Newark. Est. $150,000.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Baypoint—PLANT—Armstrong Cork Co., Lancaster, Pa., sketches plant. $1,000,000. **Maturity indefinite.**

Mo., St. Louis—PACKING PLANT—Sieloff Packing Co., 4329 Natural Bridge Ave., postponed taking bids altering and constructing 3 story, basement, 80 x 175 ft., brick, rein.-con. addition, Natural Bridge Ave. Wedemeyer & Nelson, 824 Wainwright Bldg., and Bonnell-Tohntz Co., 1515 North Grand Blvd., assoc. archts. Noted Aug. 27.

N. J., Garfield—LAUNDRY—F. Sciortino & V. Lamendola, Main St., will not build 1 story, basement, brick, steel, Division Ave. $40,000. Project abandoned. A. L. Vegliante, 40 Passaic St., archt. Noted Oct. 1.

N. J., Lyndhurst—PRINTING PLANT and OFFICE—Commerical Leader Co., Inc., 356 Valley Brook Ave., 2 story, basement, brick, steel Valley Brook Ave. $40,000. **Maturity in spring.** Architect not appointed. Noted Sept. 24.

N. Y., New York—PLANT—Baird Television Corp., 145 West 45th St., plant and equipment in or near city. Project in abeyance. $40,000. Noted Sept. 17.

Okla., Muskogee—ICE PLANT and STORAGE—Community Ice & Produce Co., Sulphur Springs, Tex., soon lets contract 2 story, basement, rein.-con., brick, 30 ton per day capacity ice plant and cold storage, 5th and Denison Sts. $50,000. Noted Sept. 17.

Okla., Muskogee—ICE PLANT and COLD STORAGE—G. E. Wells, Inc., Little Rock, Ark., soon lets contract rein.-con., brick, 60 ton daily capacity, Cherokee and Fon du Lac Sts. $125,000.

Ore., The Dalles—PLANT—Oregon Natural Gas Co., Portland, installing pipes and central plant for distribution natural gas. $80,000.

Texas—REFINERIES—Humble Oil & Refining Co., Humble Bldg., Houston and Port Arthur, surveys, plans, etc., 3 refineries, 1 each at Pitner Junction, Kilgore and Gladewater. Est. $1,000,000.

Tex., Harlingen — PACKING PLANT — J. Morris, Jr., 322 North Commerce St., soon lets contract 1 and 2 story, 60 x 128 ft., brick, rein.-con. packing plant, incl. coloring rooms and storage rooms, West Jackson St. Private plans.

Tex., Houston — REFINERY — Hartman Interests, Inc., c/o E. W. Hartman, pres., Los Angeles, Calif. H. W. Hartman, vice pres., Gulf Bldg., Houston, refinery, $2,500,000; also pipe lines. Total est. $4,000,000. Owner builds. M. Lentz, Houston, ch. engr.

BIDS ASKED

Calif., Pasadena—NEWSPAPER PUBLISHING PLANT—Bennett & Haskell, archts., 1st Trust Bldg., taking bids 2 story, basement, rein.-con. plant for Pasadena Post. $100,000. Noted June 4.

Kan., Arkansas City—PACKING PLANT—See "Contracts Awarded."

Mo., Windsor—SHOE FACTORY—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Highland — ORANGE PACKING PLANT—Highland Orange Assn., general contract 1 story, 90 x 130 ft., rein.-con., tile filler wall, to G. Donald, 50 East Vinde St., Redlands. $60,000.

Ill., Chicago—MILK STATION—Sidney Wanzer & Sons, 124 West Garfield Ave., general contract 1 and 2 story, 148 x 200 ft., brick milk station, garage, office, refrigerating department, to G. Thompson & Sons Co., 30 North La Salle St.; plumbing to Noble & Thum, 1065 Addison St.; structural steel, to Vierling Steel Wks., 313 West 23rd St. Noted July 23.

Kan., Arkansas City—PACKING PLANT—Keefe-LeStourgeon Co., R. T. Keefe, pres., 3 story, 60 x 125 ft., concrete, brick addition, insulated throughout, refrigeration equipment, day labor. $40,000. E. Moore, Arkansas City, archt.

Me., Dixfield — FACTORY — Berst-Foster-Dixfield Co., F. W. Smith, mgr., West Peru, 3 story, 105 x 200 ft., brick, steel addition, plain found., to J. H. Kerr, Prospect St., Rumford. Est. $40,000 or more. Noted Sept. 17.

Mass., Brighton—BAKERY and GARAGE—Dorothy Muriel's Food Shops, 1368 Beacon St., 1 and 2 story, brick, concrete, plain founds., to S. McNeilly, 35 Webster St., Brookline. Est. $40,000. Noted Sept. 3.

Mass., Salem—ASBESTOS SHINGLE FACTORY—Donnell & Mudge, Canal St. and Ocean Ave., 2 story, brick, timber, concrete, concrete found., Canal St., to Pitman & Brown Co., 11 Washington St.

Mass., Waltham—BAKERY—Hathaway Baking Co., Elm St., altering and constructing 2 story, basement, brick, concrete addition, plain found., to Hardy & Streeter, 153 Upland Rd., Cambridge. Est. $40,000.

Mich., Detroit—AUTO POLISH FACTORY—C. H. McAleer Mfg. Co., 7401 Lyndon Ave., 1 story, brick, steel addition, plain found., to Austin Co., General Motors Bldg. Est. $50,000.

Mich., Mt. Clemens—REFRIGERATOR FACTORY—Copeland Products, Inc., Mt. Clemens, 1 story, 50 x 120 ft. and 50 x 200 ft., brick, steel, rein.-con. buildings, plain founds., to Beyster & Olmsteand, Inc., 2-203 General Motors Bldg., Detroit. Est. $50,000.

Minn., Two Harbors—GAS PLANT—City Council. Butane Gas Plant, brick, hollow tile, rein.-con. found., also complete gas distribution system, to R. O. Moore & Co., Tulsa Nat'l Bank Bldg., Tulsa, Okla., $51,778.

Mo., Jefferson City—NEWSPAPER PLANT and OFFICE—Jefferson City Post Tribune, 2 story, basement, 44 x 120 ft., brick, rein.-con., to W. N. Brown, c/o Ben Hur Erection Co., 5100 Farlin St., St. Louis. Noted Jan. 22.

Mo., Windsor—SHOE FACTORY—International Shoe Co., W. H. Moulton, pres., 1501 Washington Ave., St. Louis, will build shoe factory, 40,000 sq.ft. floor space, day labor. $80,000. Noted Sept. 3.

N. J., Edgewater—FACTORY—Stone & Webster, engrs. and archts., 210 Bway., New York, remodeling 4 story, factory, by separate contracts for Lever Bros., 380 7th Ave., New York, est. $40,000. Steel to Jones & Laughlin Steel Co., 165 Bway., New York. Noted July 30.

Pa., Millvale — DAIRY — Miller Bros., 925 Evergreen Rd., 1 and 2 story, 32 x 84 ft., brick, steel, 925 Evergreen Ave., to R. L. Stearheim, 6 Reel Ave., West View. Est. $40,000.

R. I., Harrisville — PLANT — Stillwater Worsted Co., Harrisville, 2nd story addition to wool scouring building, to Temple & Crane, Inc., 80 Federal St., Boston, Mass.

Tex., Smithville — SAW MILL — Smithville Lumber Co., H. R. Hope, Smithville, 30,000 ft. capacity saw mill. Owner builds.

Wash., Seattle — PLANTS — National Steel Constr. Co., J. Wilson, pres., 425 Frontenac St., rebuilding 60 x 150 ft. steel plant and 40 x 90 ft. galvanizing plant, recently destroyed by fire, to H. D. Stewart, Dexter Horton Bldg. $85,000 loss.

GARAGES

PROPOSED WORK

Mass., Quincy—Corey Bros., 12 Shaw St., 2 story, 50 x 100 ft., brick auto service and public garage, Washington St. $50,000. Project abandoned. Private plans. Noted June 4.

N. Y., Albany—Terminal Associates, c/o Sibley & Fetherston, archts., 205 East 42nd St., New York, remodeling 2 story, 75 x 140 ft. bus terminal, Bway. $50,000. **Maturity indefinite.**

N. Y., Long Island City—Queensboro Dairy Co., 42nd St. and 35th Ave., garage and office, 41st St. and 35th Ave. $40,000. **Maturity in November.** Noted Sept. 17.

Ont., Toronto—Hoar Transport, Ltd., 40 Oxford St., plans by R. H. Bishop, Harbor Bldg., 1 and 2 story, brick, concrete, steel, garage and truck terminal, concrete found., Eastern Ave. $100,000.

BIDS ASKED

Mass., Franklin—See "Contracts Awarded."

N. J., Somerville—P. C. Van Nuys, archt., 1 West Main St., taking bids, general contract 2 story, basement, 100 x 200 ft., brick, steel garage, store, for Owner, c/o architect. $150,000.

CONTRACTS AWARDED

Ill., Chicago—Firestone Tire & Rubber Co., 1920 South Michigan Ave., sales, service, and storage building, to Austin Co., 16112 Euclid Ave., Cleveland, O.

Mass., Franklin—R. Vozella, City Mills, 1 story, 90 x 100 ft., brick, steel auto service and showroom, 42 East Central St., separate contracts. Est. $40,000. Private plans. Noted Sept. 24.

Mass., Waltham—M. Sullivan, 1025 Main St., 1 story, brick, steel, rein.-con. garage, repair shop, plain found., Main St., to J. B. Delaney & Son, 79 Francis St. Est. $40,000.

Pa., Blawnox—Sun Oil Co., W. A. Courtney, in charge, Sun Bldg., Phila., 1 story, 65 x 100 ft., brick, rein.-con., steel, terra cotta coping, hollow tile garage, office, Freeport Rd., to Hughes Foulkrod Co., 1505 Race St., Phila.

R. I., Providence—Cohen Auto Supply Co., 123 Wickendon St., altering and constructing 1 story, basement, brick, concrete, steel service station addition, plain found., to Hope Building Co., Inc., 36 Exchange St. Est. $40,000.

POWER PLANTS

PROPOSED WORK

Ariz., Stafford—Arizona General Utilities C S. Cobb, mgr., power plant addition, new m chinery. $70,000.

Mich., Detroit—Detroit Edison Co., 2000 2 St., completed plans steam power plant ad tion, Connors Creek Station. Est. $1,000,00

Wash., Seattle—City Council voted to pu chase uncompleted City Light Tower, a plans 2 story addition for substation, hea quarters, 3rd Ave. and Madison St. $400,00 $500,000.

CONTRACTS AWARDED

Ark., Pine Bluff—Arkansas Power & Lig Co., E. Couch, pres., power plant improvemen incl. new transmission lines, substation i provements, own forces. $375,000. Priva plans.

Ia., Sioux City—Sioux City Service Co., J. F Everson, supt., Big Sioux Power Plant, 1 stor 40 x 70 ft., rein.-con., brick power plant add tion, day labor.

Minn., Minneapolis—Commander Milling Co S. W. Jolly, secy., 661 Chamber of Commer Bldg., instaling 800 hp. Diesel generating uni 2 500 hp. synchronous motors, to Fairbank Morse & Co., Park Square, St. Paul. Es $190,000.

N. Y., Geneseo—Commissioner Dpt. Educatio Education Bldg., Albany, boiler plant, servi connections, to C. A. Foote & Sons, Mou Morris, $5,585 heating, to Barr & Creelma 74 Exchange Pl., Rochester, $11,412. Note Aug. 13.

N. Y., New York—New York Edison Co 4 Irving Pl., altering power plant, 700 Ea 15th St., to Kenn Well Constr. Co., 45 Ea 17th St.; structural steel, to Post & McCor 101 Park Ave., New York, Noted Sept. 2

Utah, Lehi—City, one 180 hp. and one 21 hp. diesel engines, with switchboard, found building, etc., to Fairbanks Morse & Co., 14 S.W.T., Salt Lake City, $63,000.

Ontario—Abitibi Power & Paper Co., 86 Un versity Ave., Toronto, 114 mi. transmissio line, in Abitibi Canyon, to Lang & Ross, 620 Queen St., Sault Ste. Marie. Est. $1,000,000.

WAREHOUSES

PROPOSED WORK

N. Y., Brooklyn—C. W. and P. C. Heidleberger, 180 Franklin St., soon takes bids general and separate contracts storage manufacturing and loft buildings. $40,000. W. B. Wills 28 Adams St., Floral Park, archt. Noted Sept. 24.

N. Y., Brooklyn—H. M. Hillman, Flatbush Ave. extension and Myrtle Ave., altering 3 stor storage, Flatbush Ave. extension and Myrtle Ave. Project indefinitely in abeyance. Erling Owre, 53 Fort Hill Circle, St. George, archt. Noted July 16.

N. Y., Brooklyn—Paramount Ice Co., 85 Steuben St., plans by G. J. Lobenstein, 885 Flatbush Ave., 1 story, 75 x 100 ft. i storage, Emerson Pl. and Myrtle Ave. $60,000.

N. Y., Brooklyn—Standard Oil Co. of New York, Kingsland and Norman Aves., plans by Jones & Larson Corp., archts. and engrs., 58-61 55th St., Maspeth, 1 story, 50 x 150 ft. storage.

N. Y., New York—Globe Storage Warehouse Corp., c/o L. Cella, 810 East 170th St., New York, warehouse, auto showroom, storage, Field Pl. and Grand Concourse. $500,000.

N. Y., New York—One Hundred Eleven West End Corp., and New York Central R.R. Co F. B. Freeman, ch. engr., 466 Lexington Av warehouse, West End Ave. from 64th to 65th Sts. $1,500,000. **Maturity in spring or later.** DePace & Juster, 151 West 46th St., archts. Noted July 23.

N. Y., New York—One Hundred Six to One Hundred Eight Fulton Street Corp., A. E. Cohen pres., 206 Bway., altering storage, loft and manufacturing plant, incl. new plumbing, 10 Fulton St. and 14 Dutch St. $40,000. C. N Whinson & Bros., 2 Columbus Circle, archts.

Pa., Erie—H. F. Watson Paper Co., A. Cooney in charge, 143 East 16th St., Erie, subsidiary Ruberoid Co., 95 Madison Ave., New York, 1 story, 80 x 200 ft. and 46 x 128 ft., asbesto siding, steel, rag warehouse and rag cutting building, East 16th St. $40,000. Privat plans.

Tenn., Memphis—Carloss Well Supply Co South Front and Gayoso Sts., plans by G Mahan, Jr., City Savings Bank Bldg., brick stone warehouse and sales office, incl. traveling crane, for handling pipe, full size well derrick on top, North Main St. and Concord Av $40,000.

Ont., Toronto—C. James, c/o Kaplan & Sprachman, archts., 305 Dundas St., W., plan 8 story, basement, 40 x 101 ft. rein.-con., steel brick, stone, loft building, Spadina Ave. an Richmond St. $200,000.

BIDS ASKED

Mass., Chelsea—Panco Rubber Co., M. Birnstein, 31 Highland Ave., taking bids 2 story basement, timber, steel storage, concrete found. Highland Ave. and Congress St. $40,000. S Schein, 333 Washington St., Boston, archt. Noted Sept. 24.

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